

CALENDAR  
OF

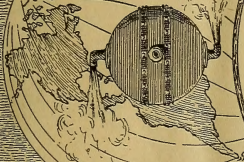
INVENTION AND DISCOVERY

COMPILED BY  
JOHN CASSAN WAIT.

McGRAW PUBLISHING CO., NEW YORK.

DAY UNTO DAY  
UTTERETH SPEECH

NIGHT UNTO NIGHT  
SHOWETH A LAMP



W. & J. B. BIRDSONG CO. NEW YORK

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CHICAGO, ILL.

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# A CALENDAR OF INVENTION AND DISCOVERY.

COMPILED BY

JOHN CASSAN WAIT,

ATTORNEY AND COUNSELLOR AT LAW AND CIVIL ENGINEER;  
AUTHOR OF ENGINEERING AND ARCHITECTURAL JURISPRUDENCE;  
1895 EDITION THE CAR-BUILDERS DICTIONARY, ETC.

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*"The doings of men are the subject of this book."—JUVENAL.*

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NEW YORK.

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# A CALENDAR OF INVENTION AND DISCOVERY.

## A Review of the Personal Contributions of the Greatest Inventors and Discoverers to the Industrial Progress of the World.

OF BIOGRAPHY.—There is properly no history, only biography.—EMERSON.

Biography is by nature the most universally profitable, universally pleasant, of all things; especially biography of distinguished individuals.—CARLYLE.

The youth of a nation are the trustees of posterity. . . . The history of heroes is the history of youth. —LORD BEACONFIELD.

No species of writing seems more worthy of cultivation than biography, since none can be more delightful or more useful. None can more certainly enchain the heart by irresistible interest, or more widely diffuse instruction to every diversity of condition.—JOHNSON.

As you say, you need concentration, and more knowledge and thought about serious and important matters. . . . Shall I make one suggestion to you? Read biographies of great men—statesmen, soldiers, philosophers, saints. There is no kind of reading more interesting, or which has a greater in-

fluence on character. It is one of the principal means by which a man may educate himself.—BENJAMIN JOWETT.

Homer was a beggar; Plantus turned a mill; Terence was a slave; Boethius died in jail; Paul Borghese had fourteen trades, and yet starved with them all; Tasso was often distressed for a few shillings; Bentivoglio was refused admittance into a hospital he had himself erected; Cervantes died of hunger; Camoens, the celebrated writer of the *Lusiad*, died in an alms-house; and Vasco left his body to the surgeons to pay his debts, as far as it would go. In England, Bacon lived a life of meanness and distress; Sir Walter Raleigh died on the scaffold; Spenser—the charming Spenser—died forsaken and in want; and the death of Collins came through neglect, first causing mental derangement; Milton sold his copyright of *Paradise Lost* for £15, and finished his life in obscurity; Dryden lived in poverty and distress; Otway died

prematurely and through hunger ; Lee died in the streets ; Steele lived a life of perfect warfare with bailiffs ; Goldsmith's Vicar of Wakefield was sold for a trifle, to save him from the grip of the law ; Fielding lies in the burying-ground of the English factory at Lisbon, without a stone to mark the spot ; Savage died in prison at Bristol, where he was confined for a debt of £8 ; Butler lived in penury, and died poor ; Chatterton, the child of genius and misfortune, destroyed himself.—**CALAMITIES OF GENIUS.**

**OF PROGRESS**—Mankind in the thirteenth century had neither looked into heaven nor earth, neither into the sea nor the land, as has been done since. It had philosophy without scale, astronomy without demonstration. It made war without powder, shot, cannon or mortars ; nay, the mob made their bonfires without squibs or crackers. It went to sea without compass, and sailed without the needle. It viewed the stars without telescopes, and measured altitudes without barometers. Learning had no printing-press, writing no paper, and paper no ink. The lover was forced to send his mistress a deal board for a love-letter, and a billet-doux might be of the size of any ordinary trencher. It had clothiers without manufacturers, and the richest robes were the skins of the most formidable monsters. It carried on trade without books, and correspondence without posts ; its merchants kept no accounts, its shopkeepers no cash-books. It had surgery without anatomy and physicians without *materia medica*.

The scholar mourns and antiquity weeps over the wreck of ancient learning and art—the philosopher regrets that sufficient of both has not been preserved to elucidate interesting discoveries, which history has mentioned ; nor to prove that those principles of science, upon which the action of their machines depended, were understood. The mechanic seeks in vain the processes by which his predecessors in remote ages worked the hardest granite without iron, transported it in masses that astound us, and used them in the erection of stupendous buildings, apparently with the facility that modern workmen lay bricks or raise lintels of doors. We are ignorant of their modes of working metals, of their alloy which rivaled steel in hardness, of their furnaces, crucibles, and moulds ; or of the details of forming the ennobling statue. Unfortunately learned men of old deemed it a part of wisdom to conceal from the vulgar all discoveries of science. They wrapped them in mystical figures that the people might not apprehend them.

Whenever we attempt to penetrate the obscurity which conceals from our view the works of the ancients, we regret that their mechanics did not, for the sake of posterity and their own fame, write a history and description of their machines and manufactures.

“ Searching wits,  
Who graced their age with new inventive arts.”  
—**JENKIN : VIRGIL.**

Notwithstanding the opinion of Plato, we believe a description of the workshops of Dædalus and of



Talus, his nephew; those of Theodorus of Samos and Glaucus of Chios, or an account of the manufacture of the famous Lesbian and Dodonean cauldrons; or of the execution of those celebrated paintings in glass, which have puzzled both our artists and our chemists; or a description of a working jeweler's shop of Persopolis and of Troy; or of a lapidary's and an engraver's shop of Memphis; or of a cutler's and upholsterer's of Damascus; or of a cabinet-maker's and brazier's of Rome; or of a Sidonian or Athenian ship yard—would have been more truly useful and more really interesting than all that ancient philosophers ever wrote or poets ever sung.

A description of the foundries and forges of India and of Egypt, of Babylon and Byzantium, of Sidon and Carthage and Tyre, would have imparted to us a more accurate and extensive knowledge of the ancients, of their manners and customs, their intelligence and progress, than all the works of their historians extant, and would have been of infinitely greater service to mankind.

Had a narrative been preserved of all the circumstances which led to the invention and early application of the lever, the screw, the wedge, pulley, wheel and axle, and of those which contributed to the discovery and working of the metals, the use and management of fire, the growth of agriculture, the spinning of thread, the matting of felt, and the weaving of cloth, it would be the most perfect history of our species—the most valuable of earthly legacies. Though such a work might have been of

trifling import to philosophers of old, with what intense interest would it have been pursued by scientific men of to-day! What pure delight its examination would have imparted to every inquisitive and intelligent mind!

Such a record would not only have filled the mighty chasm in the early history of the world, but would have had an important influence in promoting the best interests of our race. It would have embraced incidents respecting man's early wants and his rude efforts to supply them; particulars of such thrilling interest as no modern novelist could equal, nor the most fertile imagination surpass.

To poets and writers of romance, the annals of mechanism present unexplored sources of materials. They are mines of the richest ore—fields teeming with the choicest fruits and flowers. Here are to be found incidents as agreeable and exciting in their natures and as important in their effects as anything that can be realized by the imagination alone; such, too, as present nothing to offend the finest taste or conflict with the purest morals. When novelists have worn out the common ground (and they seem already to have done so), when mere sentiment grows flat, and the exhibition of the passions become stale; when politics, history and love are exhausted—works founded on the origin, progress, and maturity of the useful arts will both charm the imagination and improve the judgment of readers. Does an author wish to introduce characters who have left permanent impressions of their genius upon the world? Where can he find them in such

variety as among inventors? Is he desirous of enriching his pages with singular coincidences, curious facts, surprising results—to fascinate his readers and cause them to anticipate the end of his pages with regret? Let him detail the circumstances that led to the conception and accompanied the improvement of those inventors and discoverers who have elevated civilized man above the savage.—THOMAS EWBANK.

On reflection it will be found that mechanical invention differs nothing from that which gives value to those pursuits considered to be more mental and refined. Homer and his *Iliad*, Virgil and his *Æneid*, Milton and his *Paradise Lost*, were minds and productions of the same exquisite fiber and tension with Savary and Watt, with their engines, Huygens with his watch, Arkwright with his spinning frame, Meikle with his threshing machine, Bramah with his hydraulic press. In fact, observation frequently shows that the power of constructing poetry and machines is united in the same individual. Hooke made verses as well as machines, and could as well have written a sonnet to his "mistress' eyebrows" as have presented his thirty-seven projects for flying. Samuel Moreland indited love songs and sang them to his sweetheart. When total blindness had fallen on the jovial old man he buried the effusions of his youth, considering them to be "gay deceits," and betook himself in his ninetieth year to the composition of psalms. Arkwright was famed among his customers for a light hand and an exquis-

site edge, and for verses which cut as keen as his razors. Watt in his youth was a rhymster, and few men in his generation read more fairy tales and poetry; even in the meridian of his life, in the busiest period of his employment, the greater portion of his time was devoted to indulgence in this mental luxury. Few who knew the excellent Renée, near the close of his life, would have dreamed of finding under the exterior of this inflexible man of business an enthusiastic admirer of poetry and music. The venerable Telford, when building rough stone walls as journeyman mason, was an esteemed contributor to the poetical corner of the *Scots Magazine*. The inventor of the celebrated Congreve rocket had previously "let off" many poetical squibs. Cartwright early distinguished himself for his poetical compositions; but the fine taste and exalted feeling which pervade them must yield to the exquisite invention and extensive usefulness of his power-loom.

Poets, as well as mechanics, differ in the manner in which they exhibit their conceptions. One excels in loftiness of thought, another in delicacy of perception; a third pleases by his harmonious numbers and a fourth is esteemed for the useful tendency of his writings. Some mechanics delight in clockwork, others in steam-engines. The machines of others are polished even to a bolt head, and a ponderous mass, whose jerking motion is the nuisance of a district, constructed by another, whose ear is more refined than his rival manufacturer's, moves with all the softness of a watch; while yet another

applies the principles of a toy to a machine for abridging labor. There are rhymsters who will spin a fine thought through an infinity of words; there are also artist wire-drawers, who, by great skill will draw an ounce or two of gold into a thread which will encircle the world. Your soundings, flashy, sparkling authors of a thousand brilliant nothings are a sort of kaleidoscope artists, whose most original, regular and harmonious combinations are produced by a thread of rag, a pin's head, a leaf, a bead or a bit of crystal.—INVENTORS AND POETS: HENRY HOWE.

OF POETRY.—There is no need to espouse the cause of poetry, which, if it required championship, would not lack for defenders, for who that is capable of understanding its grandeur does not in his soul do homage to the "child of passion and thought" and music's twin sister? Poetry should be substituted for music in Lorenzo's soliloquy and it should be said:

*The man that hath no poetry in himself  
Nor is not moved by concord of sweet sounds  
Is fit for treasons, stratagems, and spoils;  
The motions of his spirit are dull as night,  
And his affections dark as Erebus.*

—*Merchant of Venice, Act V., Scene I.*

Poetry is the imaginative and musical revelation of life which enlarges our outlook, enriches our natures, lifts our souls to the contemplation of the verities, and makes us to bow, hushed and happy,

at the Shrine of the Eternal Beauty. Poetry is educational in the highest, deepest sense, and has always been so regarded by the best educators; it is as Wordsworth said, "the breath and finer spirit of all knowledge."—ANONYMOUS.

Poetry teaches the enormous force of a few words, and, in proportion to the inspiration, checks loquacity. It requires that splendor of expression which carries with it the proof of great thoughts. Great thoughts insure musical expression. Every word should be the right word. The poets are they who see that spiritual is greater than any material force, that thoughts rule the world. The great poets are judged by the frame of mind they induce; and to them, of all men, the severest criticism is due.—PARNASSUS: EMERSON.

But we shall know that poetry is the wheel and true state of man, the proper and last ideal of souls, the free beauty they long for, and the rhythmic flow of that universal play in which all life would live.—HORACE BUSHNELL.

Till he has fairly tried it, I suspect a reader does not know how much he would gain from committing to memory passages of real excellence, precisely because he does not know how much he overlooks in merely reading. Learn one true poem by heart, and see if you do not find it so. Beauty after beauty will reveal itself, in chosen phrase, or happy music, or noble suggestion, otherwise undreamed of. It is

like looking at one of nature's wonders with a telescope.

Poems and noble extracts, whether of verse or prose, once so reduced into possession and rendered truly our own, may be to us a daily pleasure—better far than a whole library unused. They come to us in our dull moments to refresh us with spring flowers; in our selfish musings, to win us by pure delight from the tyranny of foolish castle-building, self-congratulations and mean anxieties.

They may be with us in the workshop, in the crowded streets, by the fireside; our own in times of joy or of tribulation; sometimes, perhaps, on pleasant hill-sides or by sounding shores—noble friends and companions—our own; never intrusive, ever at hand, coming at our call.

If the mind were thus daily nourished with a few choice words of the best English poets and writers; if the habit of learning by heart were to become so general that, as a matter of course, any person presuming to be educated amongst us might be expected to be equipped with a few good pieces, I believe it would lead to far more than the mere sound it suggests, to the diffusion of the best kind of literature and the rich appreciation of it, and men would not long rest satisfied with knowing a few stock pieces.

I come back, therefore, to this, that learning by heart is a good thing, and is neglected amongst us. Why is it neglected? Partly because of our indolence, but partly, I take it, because we do not sufficiently consider that it is a good thing, and needs to

be taken in hand. We need to be reminded of it; I here remind you. Like a town-crier, ringing my bell, I would say to you, "Oyez, oyez! Lost, stolen or strayed, a good ancient practice—the good ancient practice of learning by heart. Every finder will be handsomely rewarded."

If any ask, "What shall I learn?" the answer is, Do as you do with tunes—begin with what you sincerely like best, what you would most wish to remember, what you would most enjoy saying to yourself or repeating to another.—VERNON LUSHINGTON.

If you would believe some whose zeal is not according to knowledge, science is antagonistic to poetry. The diamond is, for the chemist, no better than lampblack, the sapphire and the ruby only crystallized clay. The Medicean Venus and the Apollo Belvidere, "the statue that enchants the world" "the god of the unerring bow," are interesting to him only as grand stalactites; curious solely because each of them contains twenty-two parts of carbonic acid and twenty-eight of lime.

A thunder storm has for him neither terror, nor beauty, nor sublimity; it is only the union of so much positive and negative electricity. The sea which in other men's minds gives birth to so many deep and unspeakable emotions is only a great pool or puddle filled with a solution of table salt and epson salts.

I would reply, "I am a chemist. Hath not a chemist eyes? Hath a chemist hands, organs, dimensions, senses, affections, passions, fed with the



same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed and cooled by the same summer and winter as is the poet? If you prick us, do we not bleed? If you tickle us, do we not laugh? If you poison us, do we not die? And if you wrong us, will we not revenge?"

The revenge we take is to affirm that between the true poet and the true philosopher there never has been, or can be, cause of feud. It has been the poetaster on the one hand, the dabbler in science on the other, who have involved the lovers of truth and of beauty in a most needless and foolish dispute. All things in nature are like Janus, two-faced, and have a double aspect for us. In the one, they are plain facts calmly apprehended by the cool intellect; in the other, they are truths which set heart and brain on fire.

Poetry and science stand in direct contrast, but not in opposition to each other. The aim of science is truth, the desire of poetry is beauty, and in a glorious sense all truth is beautiful and all beauty is true. It is not necessary to destroy the truth before we can discern the beauty, nor to bid farewell to the beauty before we can discover the truth.

—Dr. GEORGE WILSON.

It has been said that poetry and truth were antagonistic, and that by no process could they be fused in the crucible of genius. Coleridge held that

science and poetry were irreconcilable. Edgar Poe insisted on the same fallacy, yet Shakespeare and Wordsworth made truth and poetry compatible. Shakespeare had intuitions of science, Wordsworth was a botanist and Shelley was imbued with exact science. Never does Tennyson sing so sweetly as in his refigurations of the truths discovered by science. Dr. Darwin's poems are replete with scientific investigation and discovery. Emerson's poetry is thoroughly scientific; his verse, like his prose, electrifies the nerves and fibres and elicits a thrilling response. His science does not introduce a single discordant note in his poetry and Goethe was a great reconciler. He has mingled history, philosophy, science and fable into an integral whole of wondrous beauty.

—*From Science in Song*: THOMAS E. MAYNE.

Poetry reveals to us the loveliness of nature; brings back the freshness of youthful feeling; revives the relish of simple pleasures; keeps unquenched the enthusiasm which warmed the spring-time of our being; refines youthful love; strengthens our interest in human nature by vivid delineations of its tenderest and loftiest feelings; spreads our sympathies over all classes of society; knits us, by new ties, with universal being; and, through the brightness of its prophetic visions, helps faith to lay hold on the future life.

—*Exalted Character of Poetry*: CHANNING.

OF BOOKS AND READING—Choice reading is to be found in good books, which have to be selected from a great mass of reading matter. Libraries contain good books, but it is not easy to discover books bearing upon subjects most interesting to a student. This is especially true of scientific and industrial works. To aid the reader the author has throughout the calendar given the names of the principal works written and published by the men whose biographies are given. These constitute a fairly complete bibliography of scientific research, the industrial arts, invention and discoveries. While discoverers and inventors have not always recorded their experiments and chronicled their discoveries, yet there are many great and worthy books written by the persons who are the subject of this calendar. In most instances the titles and dates of publication of the important works of each person are given.

A course of reading in any branch of science or industrial art in these books mentioned cannot fail to strengthen the reader in his special subjects, for they are the records of the trials and crowning victories of the pioneers who contributed most to our industrial progress and discovered the fundamental laws of our creation and existence.—AUTHOR.

*There they reign,*

*In loftier pomp than waking life had known,  
The kings of Thought! not crowned until the grave.*

*When Agamemnon sinks into the tomb,*

*The beggar Homer mounts the monarch's throne!*

*Ye ever-living and imperial souls,  
Who rule us from the page in which ye breathe!  
What had we been had Cadmus never taught  
The art that fixes into form the thought—  
Had Plato never spoken from his cell,  
Or his high harp blind Homer never strung?  
Kinder all earth hath grown since genial Shakespeare sung!*

*Lo! in their books, as from their graves, they rise,  
Angels that, side by side, upon our way  
Walk with and war'n us! Hark! the world so loud,  
And they, the movers of the world, so still!*

*From them how many a youthful Tully caught  
The zest and ardor of the eager Bar!*

*By them each restless wing had been unpurled,  
And their ghosts urge each rival's rusting car!*

*They made you preacher zealous for the truth;  
They made you poet wiseful for the star;*

*Gave age its pastime, fired the cheek of youth,  
The unseen stirs of all our beings are.*

*All books grow homilies by time; they are  
Temples, at once, and landmarks. In them, we  
Who, but for them, upon that inch of ground  
We call—THE PRESENT, from the cell could see  
No daylight trembling on the dungeon bar—*

*Turn, as we list, the globe's great axle round,  
Traverse all space, and number every star,*

*And feel the near less household than the far!  
There is no past, so long as books shall live!*

*Rise up, ye walls, with gardens blooming o'er!  
Ope but that page—to! Babylon once more!*

*Books make the Past our heritage and home;  
And is this all? No, by each prophet-sage;*

*In them the Future as the Past is given—  
Even in our death they bid us hail our birth;*

*Unfold these pages and behold the heaves,  
Without one gravestone left upon the earth!*

—BULWER LYTTON.

I look upon a library as a kind of chemist's shop, filled with the crystals of all forms and hues which have come from the union of individual thought with local circumstances or universal principles.—  
HOLMES.

The chief art of learning is to attempt little at a time. The widest excursions of the mind are made by short flights frequently repeated; the most lofty fabrics of science are formed by the continued accumulation of single propositions.—LOCKE.

If we pass no day without a line—visit no place without the company of a book—we may with ease fill libraries or empty them of their contents.—  
HAZLITT.

The accumulation of knowledge is the school-room's work. The shaping of clear opinions is the work of life, and it is wonderful how many learners stop at the school-room's door and never get beyond its flower-twined gateway all their lives.—PHILLIPS BROOKS.

A man may as well expect to grow stronger by always eating as wiser by always reading. Too much overcharges nature and turns more into disease than nourishment. It is thought and digestion which makes reading serviceable and gives health and vigor to the mind.—COLLIER.

*With curious art the brain, too finely wrought,  
Preys on herself, and is destroyed by thought.  
Constant attention wears the active mind,  
Blots out our powers, and leaves a blank behind.*  
—CHURCHILL.

Read not to contradict and confute, nor to believe or take for granted, nor to find matter merely for conversation, but to weigh and consider. Some books are to be tasted, others to be swallowed, and some few to be chewed and digested; that is, some books are to be only glanced at, others are to be read but not critically, and some few are to be read wholly and with diligence and attention. Some books also may be read by deputy and extracts received from them which are made by others; but they should be only the manner sort of books, and the less important arguments of those which are better, otherwise disilled books are like common distilled waters, flashy things.

Reading makes a full man, conversation a ready man, and writing an exact man. Therefore, if a man write little, he needs a great memory; if he converse little, he wants a present wit, and if he read little, he ought to have much cunning that he may seem to know what he does not. History makes men wise, poetry makes them witty, mathematics subtle, natural philosophy deep, moral philosophy grave, logic and rhetoric able to contend; nay, there is no obstruction to the human faculties but what may be overcome by proper studies.—  
LORD BACON.

Thinking, not growth, makes manhood. There are some who, though they have done growing, are still only children. The constitution may be fixed, while the judgment is immature; the limbs may be strong, while the reasoning is feeble. Many who

can run and jump and bear any fatigue, cannot observe, cannot examine, cannot reason or judge, contrive or execute, because they do not think.

Accustom yourself then to thinking. Set yourself to understand whatever you see or read. To run through a book is not a difficult task, nor is it a very profitable one. To understand a few pages only is far better than to read the whole, where mere reading is the only object. If the work does not set you to thinking, either you or the author must be very deficient.

Great stores of knowledge are in some cases accumulated without making the man wise; because, though he has read, and remembers perhaps, he has never duly considered. It is most conducive to health to let one meal digest before we take another; it might be equally beneficial not to take up another book, perhaps not to pass another page, till we have by reflection securely made that our own which we have just been reading.

To join thinking with reading is one of the first maxims, and one of the easiest operations. There is something to work upon; the mind has only to shape, to square, to polish it, and this may be done with comparative ease. But he is not to be called a thinking man who reasons only while he reads—whose mind is vacant unless some one else fills it.—  
THINKING MAKES THE MAN.

OF ART—One of the motives of the author in publishing this calendar is to cultivate artistic tastes in those people who live in and practice the indus-

trial arts and trades. The aim in engineering—civil and mechanical—has been to economize, to secure the greatest strength and the most efficient forms and shapes at the least cost, with little regard to art. The struggle for existence that burdened the pioneer manufacturers and builders in America is past, and we are upon a great wave of commercial and industrial prosperity and in a position to look about us and to adapt to our structures and machines artistic forms. To do this requires that engineers and skilled mechanics should cultivate the fine arts, and there is need of artists and poets to present to the masses engaged in the useful arts and the applications of science the beauties of those things in which they live and work. The selections of poetry, and of painting and sculpturing, presented in this calendar will, it is believed, be a surprise not only to the industrial masses, but even to persons well-read in general English literature, and will refute the popular notion that science and the useful arts are not replete with the beautiful.—AUTHOR.

*Immortal Art! Where'er the rounded sky  
Bends o'er the cradle where thy children lie,  
Their home is earth, their herald every tongue.*  
—HOLMES.

*The heavens themselves, the planets and this center,  
Observe degree priority in place,  
Insisture, course, proportion, season, form,  
Office and custom, in all line of order.*  
—SHAKESPEARE.



*Mysterious round! what skill, what force divine,  
Deep felt in these appear! a simple train,  
Yet so delightfully mixed with such kind art,  
Such beauty and beneficence combined,  
Shade, unperceived, so softening into shade,  
And all so forming an harmonious whole,  
That, as they still succeed, they vanish still.*

—JAMES THOMSON.

*Art's perfect forms no moral need,  
And beauty is its own excuse;  
But for the dull and flowerless weed  
Some healing virtue still must plead,  
And the rough oar must find its honor  
in its use.*

*Haply from them the toiler bent  
Above his forge or plow may gain  
A manlier spirit of content  
And feel that life is wisest spent  
When the strong working hand makes  
strong the working brain.*

—WHITTIER.

*In all that now around him breathes  
Proportion sweet is ever ripe,  
And beauty's golden girle wreathes  
With mildness through his path in life  
Perfection blest triumphantly before him in  
his works soars high.*

*Gentle as beauty's lines together linking  
As the appearances that round him play  
In tender outlines in each other sinking  
The soft voice of his life thus fleets away.*

—SCHILLER.

The first and last lesson of the useful arts is that nature tyrannizes over our works. They must be conformed to her law or they will be ground to powder by her omnipresent activity. Nothing droll, nothing whimsical will endure. Nature is ever interfering with art. You cannot build your house or pagoda as you will, but as you must. There is a quick bound set to your caprice. The leaning tower can only lean so far, the veranda or pagoda roof can curve upward only to a certain point.—EMERSON.

## LIST OF ILLUSTRATIONS.

**January 12.—Archimedes**, by NICCOLO BARABINO.

When the Romans, under Marcellus, took the City of Syracuse (312 B. C.), Archimedes, who had exercised great ingenuity as an engineer in the defense of that city, was found by a Roman soldier sitting in the public square lost in study, with geometrical figures drawn in the sand around about him. As the soldier rushed upon him, Archimedes called to him not to spoil the circle, but the Roman warrior, not understanding or misconstruing Archimedes' intentions, ran him through with his spear. Thus died the Father of Engineering.

**February 11.—Chemical and Physical Laboratories, Old and New.**

The two illustrations, besides giving fair portraits of two of our greatest scientists, show the laboratories and apparatus of these two great discoverers.

**March 15.—Iron-working ; Modern Practice.**

Showing the modern process of pouring, the cupola furnace, the mould, the machines for shaping and the modern steam hammer for forging. The author is indebted to the Westinghouse Air Brake Company for these illustrations.

**April 23.—Invention of Printing.**

Gutenberg, the discoverer of printing, taking his first proof.

**May 28.—Steam and Electricity Personified.**

Two groups of figures supporting lintel of Machinery Hall, Paris Exposition ; that of Steam by M. Chapu, and that of Electricity by M. Barrias.

**June 20.—American Steel Industry, Pressing Armor Plate**, by G. W. PETERS.

**July 8.—Weaving and Spinning, the Old and the New.**

An illustration of hand and machine work, and the results of inventive genius.

**August 11.—Harvesting, the Old and the New.**

The old method by hand, by moonlight, and the new method by the modern reaper.

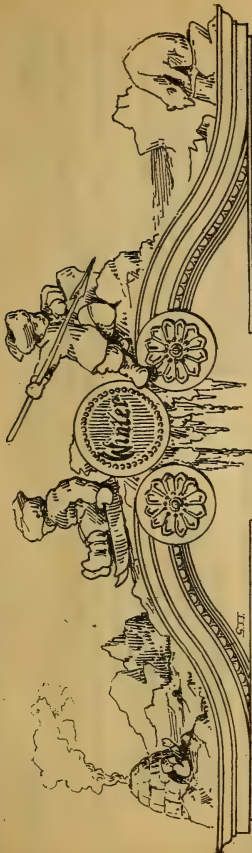
**September 11.—Architecture and Sculpture in Ancient Rome**, by L. ALMA TADEMA and L. LOWENSTAN.

**October 25.—The Ironworker and King Solomon**, engraved by JOHN SARTAIN.

By permission of the Estate of John Sartain. The King said, "Son of the Forge, I, too, honor thee, thou worthy successor of the great master, Tubal Cain. Take thou this seat at my right hand prepared for the most worthy. It is thy due."

**November 12.—Instruction : The Traveling Shoemaker**, by W. L. TAYLOR ; and **A Lesson in Shipbuilding**.

**December 15.—Discovery : Excavation of the Ruins of Pompeii**, by E. A. SAIN.



Arrested by Winter's imperious command,  
The season of bloom and of beauty is  
lost—

Fields, mountains, and valleys are touch'd  
by that hand,  
Which fetters the wide flowing rivers in  
frost.

Yet many a pleasure cheers the day  
Beneath the Winter's rugged sway;  
The roses that rub their little snow,  
The rosy cheek of health bestow;  
Nor though to rosy sport inclined,  
Neglect the culture of thy mind.

Al! Winter, calm thy cruel rage,  
Release the struggling year;  
Thy power is past; decrept sage!  
Arise and disappear.



TRIMPHANT SNOW



CONQUERED SNOW

# JANUARY 1.

CHARLES ELLET.

b. *January 1, 1810.*

American engineer. He planned and built (1842) the first wire suspension bridge in this country, across the Schuylkill River at Philadelphia; in 1847, the railroad suspension bridge across the Niagara River, below the falls, and the suspension bridge at Wheeling, Va. He constructed a remarkable temporary track across the Blue Ridge, he improved the navigation of the Kanawah River, and aided in locating the B. and O. Railroad. Among his most noteworthy labors was his investigation of the hydraulics of the Ohio and the Mississippi Rivers.

*Flow on forever in thy glorious robe  
Of terror and of beauty; . . . God hath set  
His rainbow on thy forehead; and the cloud  
Mantles around thy feet. And he doth give  
Thy voice of thunder power to speak of Him  
Eternally, bidding the tip of man  
Keep silence, and upon thy rocky altar pour  
Incense of awe-struck praise.*

—Niagara; Mrs. STOURMEX.  
55 B. C.—Iron chain-cables were used by the Veneti.

ANDRE MARIE CONSTANT DUMERIL.

b. *January 1, 1774.*

French physician and naturalist. For four years he supplied the place of Cuvier as professor of natural history in the Ecole Centrale. His greatest work is a "Natural History of Reptiles" (1834-1854).

*Nature will be reported. All things are engaged  
in writing their history. The planet, the pebble,  
goes attended by its shadow. The rolling rock  
leaves its scratches on the mountain; the river, its  
channel in the soil; the animal, its bones in the  
stratum; the fern and leaf, their modest epitaph  
in the coal. The falling drop makes its sculpture  
in the sand or the stone. Not a foot steps into the  
snow, or along the ground, but prints, in characters,  
more or less lasting, a map of its march.*

*All nature speaks in music—every tone  
She utters, from the crashing thunder's roar,  
Or Ocean's gush upon the rocky shore,  
Down to the insect's hum, or light wind's moan,  
Is full of harmony.*

—DREYDEN.

1799.—Georges Cuvier introduced an approved system of anatomical classification.

1817.—Baron Cuvier's Animal Kingdom was published.

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MEMORANDA AND DIARY.



## JANUARY 2.

RUDOLF JULIUS EMANUEL CLAUSIUS.

b. January 2, 1822.

d. August 24, 1888.

German physicist. With others he worked out the mechanical theory of heat and suggested the kinetical theory of gases. He discovered the principle of the virial in mathematical physics.

*Sing me a song of work and strife,  
Of the man who has shouldered his way thro' life,  
Leaving the primrose path to fools;  
Who gained the skies from the vulgar sod  
With naught save nature's sturdy tools  
Ah, there's the man for the smile of God.*

—A Plea for a Song: MAURICE B. KIRBY.

*You charm'd, indulgent Sylphs! their learned toil,  
And crown'd with fame your Torricell and Boyle;  
Taught with sweet smiles, responsive to their prayer,  
The spring and pressure of the vacuous air.*

—Botanic Garden: DARWIN.

1661.—Boyle's law of compression of gases appeared.

1775.—Laplace investigated and explained the tides.

1848.—The caloric engine was invented by John Ericsson.

1875.—Thomas Newcomen set up the first steam engine to do mining work.

LOUIS BERNARD GUYTON DE MORVEAU.

b. January 4, 1737.

d. January 2, 1816.

French chemist. In 1773 he made the important discovery of the power of certain fumigation against infectious effluvia, and checked a fatal disease by chlorine gas. In 1782 he proposed a methodical nomenclature for chemistry, and afterwards united with Lavoisier in forming that system of nomenclature which has generally been adopted. He made experiments with balloons in 1783-1784, and perfected processes for the manufacture of saltpetre in 1794.

*The fire beneath the crucible was out;  
The vessels of his mystic art lay round;  
Useless and cold as the ambitious hand  
That fashion'd them, and the small rod,  
Familiar to his touch for threescore years,  
Lay on the alchemist's rim, as if it still  
Might vex the elements at its master's will.*

*The Dying Alchemist: WILLIS.*

1772.—Dr. Joseph Priestley discovered hydrochloric acid, the only compound of hydrogen and chlorine. He invented the eudiometer to ascertain the purity of atmospheric air, or the quantity of oxygen gas in it.

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# JANUARY 3.

NATHAN BRITTON.

b. *September 2, 1808.*

d. *January 3, 1872.*

American inventor. Devoted himself to study of the laws of atmospheric electricity, and invented a new conductor known as the "continuous copper-strip."

*The crackled lightning seems ever brightening,  
And loud and long again the thunder shouts  
His battle song.*

*One quivering flush, one wildering crash,  
Followed by silence dead and dull,  
As if the cloud, let go, leapt bodily below  
To 'whelm the earth in one mad overthrow.*

—LOWELL.

1746.—Franklin experimented with electricity, and in 1748 he made an exhibition with electricity. At a picnic he "killed a turkey by the electric spark, and roasted it by an electric jack before a fire kindled by the electric bottle."

1872.—Ozone produced by means of an electrical apparatus, perfected by A. W. Wright.

1890, October.—Ozone was liquefied by Hautefeuille.

1883, March 17.—Capt. Abney photographed a disk in rapid motion by the electric spark.

JOSIAH WEDGWOOD.

b. *July 12, 1730.*

d. *January 3, 1795.*

English manufacturer of pottery. His improvements in porcelain and earthenware rendered England an extensive exporting instead of an importing country. He was also the inventor of the pyrometer and the projector of the Grand Trunk Canal.

*GNOMES ! as you now dissect with hammers fine  
The granite rock, the nodul'd flint calcine ;  
Grind with strong arm, the encircling chert's betwixt,  
Your pure Ka-o-lins and Pe-tun-kes mix !*

*O'er each red saggar's burning cave preside,  
The keen-eyed Fire-Nymphs blazing by your side ;  
And pleased on Wedgwood ray your partial smile,  
A new Etruria decks Britannia's isle.*

*Charm'd by touch, the flint lutescent pours  
Through finer sieves, and falls in whiter showers ;  
Charm'd by your touch, the kneaded clay refines,  
The biscuit hardens, the enamel shines ;  
Each nicer mould a softer feature drinks,  
The bold Cameo speaks, the soft Intaglio thinks.*

—Botanic Garden : DR. DARWIN.

*A potter near his modest cot  
Was shaping many an urn and pot ;  
He took the clay for the earthen things  
From beggars' feet and heads of kings.*

—OMAR KHAYYAM.

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# JANUARY 4.

JOHN WILLIAM DRAPER.

b. May 5, 1811.

d. January 4, 1882.  
English scientist. In March, 1840, he presented the Lyceum of Natural History of New York with the first representation of the moon's surface ever taken by photography; he was engaged with Samuel F. B. Morse in his production of the electro-magnetic telegraph; in 1847 he published his "Production of Light by Heat"; he was the first to photograph the diffraction spectrum. Among his most important works are his "Human Physiology, Statistical and Dynamical; or, the Conditions and Course of Life in Man" (1856); and his "History of the Intellectual Development of Europe" (1863).

*I do believe that the great Architect  
With all these fires the heavenly arches deck  
Only for show, and with these glistening shields  
To amaze the poor shepherd's watching in the fields;  
I do not believe that the least flower which pranks  
Our garden, hovers, or our common banks,  
And the least stone, that, in her warming lap,  
Our mother earth doth covetously wrap,  
Hath some peculiar virtue of its own,  
And that the glorious stars of Heaven have none.*  
—Du Bartas; SYLVESTER.

1839.—Prof. Draper's experiments resulted in the beginning of the photographic supply industry.

SIR PETER FAIRBAIN.

b. September

1799.

d. January 4, 1861.

English engineer and inventor. He devoted a great deal of attention to flax-spinning, and made many improvements in machinery therefor. His inventions include machines for preparing and spinning silk waste, and improvements in machinery for making rope yarn. His improvement in the roving-frame, and his adaptation of what is known as the "differential motion" to it, his success in working the "screw gill" motion, and his introduction of the rotary gill, were important factors in the growth of the efficiency of spinning machinery.

*Dare from custom to depart;  
Dare the priceless pearl possess;  
Dare to wear it next your heart;  
Dare, when others curse, to bless.  
Dare forsake what you deem wrong;  
Dare to walk in wisdom's way;  
Dare to give where gifts belong;  
Dare God's precepts to obey.*

—Dare and Do; MACAULAY.

30 B. C.—Silk and linen manufactured in the Roman Empire.

1130.—Silk culture was introduced into Sicily, 1146. Sicilians spun and wove silk.

1893.—Artificial silk made from cellulose by Chardonette.



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JOHN CALVIN MOSS.

b. January 5, 1838. d.

American inventor of processes in photo-engraving. He obtained relief plates from which printed impressions could be made. He is known as the inventor of what is called the "Moss processes."

*If you desire a noble work of art,  
Be it a poem, picture, statue, song,  
To whom do you in trust it? To the best?  
The single one selected from the mass?  
Or to a hundred of a lower grade?  
Or thousands or ten thousands lower still?  
Secure that the majority is right  
And has the highest art, the dearest skill.*

—*Vox populi, Vox dei*: 146 BLACKWOOD'S MAGAZINE, 879.

*The great benefactors of our race, the men who, by wonderful inventions, remarkable discoveries, and extraordinary improvements, have conferred the most eminent service on their fellow-men and gained the highest names in his'ory, by far the greater part have been men of humble origin, narrow fortunes, small advantages, and self-taught.*

—*Pursuit of Knowledge*: EDWARD EVERETT.

1839.—Photo-lithography introduced in preparing maps.

APELLES.

*Flourished* 330 B. C.

Grecian artist, famous as a portrait painter. His most perfect picture was Venus Anadyomene. An intimate friend of Alexander the Great, all of whose portraits he painted. Alexander forbade any man but Apelles to draw his picture. He pictured Alexander holding thunder in his hand, which was so true to life that Pliny says the hand of the king with the thunder seemed to come out of the picture.

*Around the mighty master came  
The marvels which his pencil wrought,  
Those miracles of power whose fame  
Is wide as human thought.*

—*Raphael*: WHITTIER.

*Deep buried in each heart I know there lies  
A form divine, beneath the surface crude,  
And when the master artist does bestow  
His final touch, lo, perfect forms will rise.*

—*The Form Divine*: C. W. SCAREP.

80.—Augustus became a patron of art.

67.—The Emperor Nero despoiled Corinth and its treasures in art.

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# JANUARY 6.

JOHN H. KYAN.

- b. 1775. *d.* January 6, 1850.  
English inventor. The first to preserve wood by a chemical process, in 1832. His process was called "kyanizing."

*Turn back the tide of ages to its head,  
And hoard the wisdom of the honored dead.*

—CHARLES SPRAGUE.

*Before my breath, like blazing flax,  
Man and his marvels pass away;  
And changing empires wane and wax,  
Are founded, flourish, and decay.*

*Redeem mine hours—the space is brief,  
While in my glass the sand-grains shiver,  
And measureless the joy or grief,  
When time and thou shall part forever.*

—WALTER SCOTT.

*But who shall turn the glass for man,  
When all his golden grains have ran?  
Who shall collect his scattered sand,  
Dispersed by time's unsparing hand?  
Never can one grain be found.  
Howe'er we anxious search around.*

—J. MCCREERY.

- 1865.—Robert Hooke studied the use of air in combustion.  
1761.—Torbern Olof Bergman proved that fixed air is an acid.  
1811.—Chemicals were manufactured at Salem, Mass.  
1860.—Andrews and Tail demonstrated that ozone was a condensed form of oxygen.

PHILIP DANFORTH ARMOUR.

- b. 1832. *d.* January 6, 1901.  
American philanthropist, who began life as a farmer. At twenty he went West, returning four years later worth several thousand dollars, the result of hard labor as a miner on the Pacific coast. In 1856 he formed a partnership with Frederick B. Mills in a commission business, and later, one with John Plankinton, a pioneer packer; and a third with his two brothers, in beef and pork packing, which became the most extensive of its kind. They acquired enormous wealth, Mr. Armour having at his death \$50,000,000 or more. Much money was spent in charity, including the Armour Institute of Technology, Chicago, established in 1893.

*The toils of alchemists, whose vain pursuit  
Sought to transmute  
Dross into gold, their secrets and their store  
Of mystic lore,  
What to the jibing modern do they seem?  
An ignis fatuus chase, a fantasy, a dream:*

*Yet for enlighten'd moral alchemists,  
There still exists  
A philosopher's stone, whose magic spell  
No long e may tell,*

*Which renovates the soul's decaying health,  
And what it touches turns to purest mental wealth.*  
—Moral Alchemists: HORACE SMITH.

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SANDFORD FLEMING.

b. January 7, 1827.

d.

Canadian engineer. In 1852 he was appointed one of the engineering staff of the Northern Railroad. Under his supervision, as chief engineer, the Intercolonial Railway was successfully completed, and was formally opened on July 1, 1876. The ultimate success of the Canada Pacific Railway was largely due to his skill.

*It may be said that the exposition of railway appliances was a grand and attractive aggregation of engineering science and mechanical skill, bringing within the limits of a few hours' time convenient opportunity not only to view the triumphs of the mechanic arts, but also to clearly define the history and progress of the marked and important improvements in the appliances of the greatest modern civilizing agents—railroads.*

—Western Soc.—Assoc. Engin. Soc., 1883.

PREST'S A.N.N. ADDRESS.

1833.—The South Carolina Railroad was completed, and was the longest railway in the world—135 miles.

1839.—The first railway from the Atlantic seaboard to the Missouri River was completed—the Hannibal & St. Joseph Railroad.

1864.—Northern Pacific R. R. chartered.

1864.—Postal car service on C. & N. W. R. R. begun.

1883.—Northern Pacific R. R. completed.

1885.—The last spike was driven in Northern Pac. R. R.

1885.—The last spike was driven in Cent. Pac. R. R.

JOHANN PHILIPP REIS.

b. January 7, 1834.

d. January 14, 1874.

German inventor of the first electrical instrument to which the name "telephone" was applied, in 1861. He described his instrument as one "for reproducing tones"—musical tones—and he called it "The Telephone." The name "telephone" had already been applied by Sir C. Wheatstone in 1831 to an acoustic arrangement for transmitting sounds through wooden rods to a distant place in a purely mechanical manner.

*Through thee, O piece of mechanism fine,  
I almost hear the beatings of the heart  
Of loved ones, speaking o'er the line,  
I hough from me they are many leagues apart.  
Man's greatest boon by modern science given;  
It shall be praised in every distant zone,  
And benefit all nations under heaven.*

The Telephone: CHAS. W. SCARFF.

*The far is near. Our feeble whispers fly  
Where cannon falter, thunders faint and die.  
Quick as a prayer ascending into heaven,  
Quick as the answer, "all thy sins forgiven,"  
Broad plains between us, rivers wild and wide,  
Deserts defy and mourn in heights deride,  
And yet thou'rt so close, bright, sparkling, gay,  
The self-same instant charms your heart and mine.*

—BENJAMIN F. TAYLOR.

1877.—Telephones were first put to public use.

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# JANUARY 9.

ROBERT AUGUSTUS CHESBROUGH.

b. *January 9, 1837.*

d.

American inventor and manufacturer. He began the manufacture of petroleum products in 1858, and discovered and patented in 1870 the substance now known as "vaseline."

*The triumph of the industrial arts will advance the cause of civilization more rapidly than its warmest advocates could have hoped, and contribute to the permanent prosperity and strength of the country far more than the most splendid victories of successful wars.*

—*The Exposition of 1851*: C. BABBAGE.

*Men do not keep each other down—some rise  
Thro' that celestial leaven which doth make  
Them swell to man's full stature; some are not  
Susceptible to any leaven, and stay  
As sodden dough, scarce fit for any use,  
Except the lowliest.*

—GILBERT RAMSAY.

Petroleum was known at a very early date, in springs and bogs.

1854.—Factories were established for manufacture of burning fluid.

1858.—First oil well was sunk and refineries were established, for distillation of kerosene.

MARIA CAJETANA AGNESI.

b. *March 16, 1718.*

d. *January 9, 1799.*

An Italian lady of great learning. She made astonishing progress in the study of mathematics. She was mistress of Latin, Greek, Hebrew, French, German and Spanish. She wrote upon mathematics of a high order—fluxions and analytics. The commentators of Newton were acquainted with her mathematical works while they were in manuscript. In 1801 these works were published in two volumes, at the expense of Mr. Baron Maseres, to honor her memory, and to prove that women have minds capable of comprehending the most abstruse studies.

*He (she) that will inquire out the best books in every science, and inform himself of the most material authors of the several sects of philosophy and religion, will not find it an infinite work to acquaint himself with the sentiments of mankind concerning the most weighty and comprehensive subjects.*

—LOCKE.

*It was an apt observation of the excellent Plutarch, that we ought to regard books as we do sweetmeats.*

*As Spenser is called the poet for poets, and Laplace the mathematician for mathematicians, so Bach is the musician for musicians.*

1751.—David Rittenhouse (19 years old) discovered method of fluxions.

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ADRIEN MARIE LEGENDRE.

b. 1752. d. January 10, 1833.

One of the greatest French mathematicians. His theorem on the spherical triangle, his discoveries relative to the theory of numbers, and his famous method of least squares, are sufficient to immortalize his name. Of his works the best known is his "Elements of Geometry."

*Since even Newton owns that all he wrought  
Was due to industry and patient thought,  
What shall restrain the impulse which I feel  
To forward, as I may, the public weal?  
By his example fired, to break away,  
In search of truth, through darkness into day?  
He tried on venturous wing, the loftiest flight,  
An eagle soaring to the fount of light!*

—EDMUND CARTWRIGHT.

*There is something divine in the science of numbers. Like God, it holds the sea in the hollow of its hand. It measures the earth; it weighs the stars; it illumines the universe; it is law, it is order, it is beauty.*

—KAVANAGH: LONGFELLOW.

225 B. C.—Eratosthenes of Syrene invented the armillary sphere, and attempted to determine the length of a degree.

1800.—Geometry first taught in Europe. The origin of geometry is ascribed to the Egyptians.

1831.—Sir William Snow Harris invented various forms of the compass.

JAMES JAY MAPES.

b. May 29, 1806. d. January 10, 1866.

American chemist. In 1832 he invented a new system of sugar refining, and subsequently he designed an apparatus for manufacturing sugar from the cane. He also invented numerous technical processes and made improvements in distilling, dyeing, color-making, and the tempering of steel. He developed processes for tanning hides and for the manufacture of artificial fertilizers, and originated the use of super-phosphates in the United States. He invented a lifting subsoil plough.

*Idmon, her father made it his employ  
To give the spongy fleece a purple dye.*

*With glowing purple of the Tyrian dye;  
Or, justly intermixing shades of light,  
Their colorings insensibly unite.*

—PALLAS and ARACHNE; OVID'S METAMORPHOSES.

1503.—Sugar refining was made known to the Europeans by a Venetian. First practiced in England in 1659.

1796.—Sugar first manufactured in America.

Discovery of art of dyeing is attributed to the Tyrians.

1888.—Paper-pulp first bleached by electricity as process of manufacture.

1890, January 16.—A tanner of Hayana discovered an electrical process for tanning hides in 60 hours.



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## JANUARY II.

JOSEPH JACKSON LISTER.

b. *January 11, 1756.* d. *October 24, 1869.*

English amateur optician. Discoverer of the principle upon which modern microscopes are constructed. Combining mathematical knowledge with mechanical ingenuity, and having the practical aid of the celebrated Tulley, he devised formulae for the combination of the lenses of crown glass with others of flint glass, so adjusted that the refractive errors of one were corrected or compensated by the other. He began his study of the lens in 1824, but it was not until 1830 that he contributed to the Royal Society the famous paper detailing his theories and experiments. He made many important discoveries with the microscope, the most notable being his final settlement of the long-mooted question as to the true form of the red corpuscles of the human blood.

*Whatso'er you find to do,  
Do it then with all your might;  
Never be a little true—  
Or a little in the right.  
Trifles even lead to heaven,  
So in all things, great or small things,  
Be as thorough as you can.*

—A Little Sermon.

CHARLES MACKAY.

FRANÇOIS ALEXANDRE FREDERIC,

DUC DE LA ROCHEFOUCAULT-LIANCOURT.

b. *January 11, 1747.* d. *March 27, 1827.*

French philanthropist. Founded a Savings Fund and a school of arts and sciences for the instruction of the sons of poor soldiers. He taught the poor the principles of modern agriculture, and introduced vaccination into his own country.

*And what materials, mystic alchemist;*

*Dost thou enlist*

*To fabricate this ever varied feast,*

*For man, bird, beast;*

*Whence the life, plenty, music, beauty, bloom?*

*From silence, lang'or, death, unsightliness, and gloom;*

*From nature's magic hand whose touch makes sadness*

*Eventual gladness,*

*The reverent moral alchemist may learn*

*The art to turn*

*Fate's roughest, hardest, most forbidding dress,*

*Into the mental gold that knows not change or loss.*

—Moral Alchemy: HORACE SMITH.

*The night has a thousand eyes, and the day but one;  
Yet the light of the bright world dies with the dying sun.  
The mind has a thousand eyes, and the heart but one;  
Yet the light of the whole world dies when love is done.*

—F. W. BOURDILLON.

*You may as reasonably expect oaks from a mushroom bed as great and durable profits from small and hasty efforts.*

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ARCHIMEDES.

b. about 287 B. C.

Greek mathematician. "The Father of Civil Engineering" and the discoverer of many wonderful inventions. Born at Syracuse; he took no part in state affairs, but devoted himself to the cultivation of the sciences. As a mathematician he had few rivals; as a mechanician he had none. The combination of pulleys for raising great weights, the endless screw, and the screw which bears his name, were invented by him. He is also said to have constructed a machine which represented the motions of the heavenly bodies. It was in the defense of Syracuse, when that city was besieged by Marcellus, that his inventive genius was most splendidly displayed. By his mechanical inventions the besieging force was long held at bay. Among these was a burning glass, composed of reflecting mirrors, by which he fired the hostile fleet. The city was at last taken by storm, and he was killed by a Roman soldier, because he refused to accompany him until he had solved a problem upon which he was engaged.

*Only give me a place to stand on, and I will move the world with my lever.*

—ARCHIMEDES.

*To Archimedes once a scholar came,  
"Teach me," he said, "the art that won thy fame:*

THOMAS ADDIS EMMET.

b. June 4, 1818.

d. January 12, 1880.  
American engineer; engaged in the construction of various railroads; an assistant on the Croton Aqueduct, and superintendent of the large reservoir near Brewster's, N. Y. He was one of the twelve founders of the American Society of Civil Engineers.

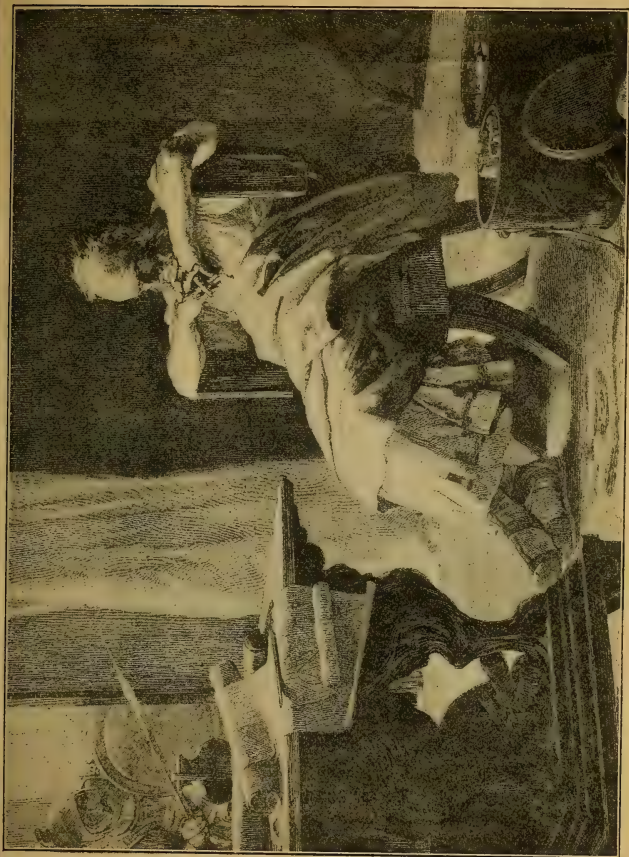
*The high prize of life, the crowning fortune of a man, is to be born to some pursuit which finds him in employment and happiness, whether it be to make baskets, or broadswords, or canals, or statutes, or songs. —Considerations by the Way: EMERSON.*

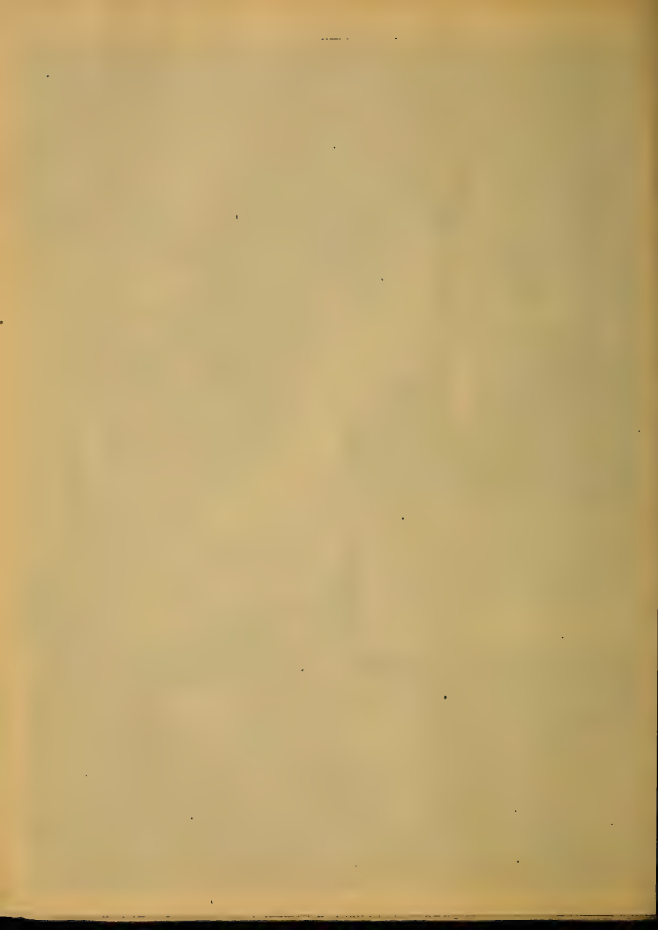
*The building swallow and the skillful bee  
Taught ancient men their gifts of masonry.  
If insects fashion waxen cells  
And stony crypts and citadels,  
How should he work in whom the Maker dwells?*

*The godlike art which gives such boons to toil,  
And showers such fruit upon thy native soil;  
The godlike art that girt the town when all  
Rome's vengeance burst in thunder on the wall;"*  
"Thou call'st art godlike—it is so in truth.  
And was," replied the master to the youth,  
"Ere yet its secrets were applied to use—

*Ere yet it served beleaguered Syracuse;  
Ask'st thou from art, but what the art is worth?  
The fruit?—for fruit go cultivate the earth—  
He who the goddess would aspire unto,  
Must not the goddess as the woman woo."*

—Archimedes: SCHILLER.







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# JANUARY 13.

ANDRE GRAINDORGE.

b. 1616. d. January 13, 1676.

French weaver, who was the first to make figured cloth representing squares and flowers.

*Straight to their posts appointed both repair,  
And fix their threaded looms with equal care :  
While hollow canes the parting warp divide ;  
Through which, with nimble flight, the shuttles play,  
And for the woof prepare a ready way ;  
The woof and warp unite, press by the toothy slay.  
Thus both, their mantles button'd to their breast,  
Their skillful fingers ply with willing haste,  
And work with pleasure ; while they cheer the eye  
With glowing purple of the Tyrian dye ;  
Or, justly intermixing shades with light,  
Their colorings insensibly unite,  
As when a show'r, transpierc'd with sunny rays,  
Its mighty arch along the heav'n displays ;  
From whence a thousand different colors rise,  
Whose fine transition cheats the clearest eyes :  
So like the intermingled shading seams,  
And only differs in the last extremes.  
Then threads of gold both artfully dispose,  
And, as each part in just proportion rose,  
Some antique fable in their work disclose.*

—Pallas and Arachne : OVID'S METAMORPHOSES,  
Book VI. Tr. by Samuel Croxall.

HUGH ORR.

b. January 13, 1717. d. December 6, 1798.

Scotch inventor. In 1753 he invented a machine for dressing flax.

*We are all inventors, each sailing out on a voyage  
of discovery, guided each by a private chart, of which  
there is no duplicate. The world is all gates, all op-  
portunities, strings of tension waiting to be struck ;  
the earth, sensitive as iodine to light, the most plastic  
and impressionable medium, alive to every touch,  
and, whether searched by the plough of Adam, the  
sword of Caesar, the boat of Columbus, or the telescope  
of Galileo, to every one of these experiments it makes  
a gracious response.*

—Resources : EMERSON.

Flax has been cultivated from the earliest historical times. The cloth in which the mummies of Egypt are enveloped is linen. Solomon bought linen in Egypt, and Herodotus speaks of Egypt's great trade in flax.

1792.—Hemp-duck first manufactured at Rhode Island.

1786.—First machine for carding, roving and spinning cotton.

1809.—Cotton duck first made for sails.

1820.—The spinning machine for flax was invented by Philippe H. Girard, a Frenchman.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

ADOLPHE THEOPHILE BRONGNIART.

b. *January* 14, 1801. d. *February* 18, 1876.

French botanist and geologist. Among his works are "Prodromus of a History of Fossil Vegetables" (1828); "Botanical and Geological Researches on Vegetables Enclosed in the Different Strata of the Earth" (1828); and "Observations on the Interior Structure of the Sigillaria Elegans."

*Who saw what ferns and palms were pressed  
Under the tumbling mountain's breast,  
In the safe herbal of the coal?  
But when the quarried means were piled,  
All is waste and worthless, till  
Arrives the wise selecting Will,  
And, out of slime and chaos, Will,  
Draws the threads of fair and fit.*

—EMERSON.

*To him who, if our earth were lost,  
And Nature wanted counsel,  
Could make it over at less cost  
From ridgepole down to groun's sill;  
Could call the Dodo back to youth,  
Could call Ornithorhynchus,  
Nay, were we gone, from just a tooth  
Could good as new re-think us!*

—AGASSIZ: J. R. LOWELL.

300-288 B. C.—History of Plants, Ethical Characters, and other works, by Theophrastus, appeared.

JOHN L. LAY.

b. *January* 14, 1832. d.

American inventor. He designed the torpedo by means of which Lieut. William B. Cushing destroyed the Confederate ram "Albatross." In 1877 he invented the submarine torpedo that bears his name.

*It was a noble Roman,  
In Rome's imperial day,  
Who heard a coward creaker  
Before the castle say:  
"They're safe in such a fortress;  
There is no way to shake it;"  
"On! on!" exclaimed the hero,  
"I'll find a way or make it."*

—J. G. SAXE.

*No more shall nation against nation rise  
Nor ardent warriors meet with hateful eyes,  
Nor fields with gleaming steel be covered o'er  
The brazen trumpets kindle rage no more,  
But useless lances into scythes shall bend  
And the broad falchion in a plough-share end.*

441 B. C.—The battering-ram, invented by Artemon, a Lacedaemonian, was employed by Pericles.

1777.—The frigate "Cerberus" was blown up by a torpedo by devices of David Bushnell.

1808.—Congreve military rockets were invented by Sir William Congreve.

1836.—A naval steam-ram was invented by James Nasmyth.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

## JANUARY 15.

LOUIS ETIENNE FRANCOIS HERICART DE THURY.  
*b. June 3, 1776. d. January 15, 1854.*

French engineer, agriculturist and geologist. As engineer-in-chief he directed the immense works of the catacombs of Paris for about 20 years (1810-1830). He wrote a work on "Artesian Wells" (1823), and many treatises on mines, ores, etc.

*We have the high authority of history, sacred and profane, for declaring that agriculture is a dignified and time honored calling, ordained and favored by Heaven, and sanctioned by experience; and we are invited to its pursuit by the rewards of the past and the present, and the rich promises of the future. . . . How many dark recesses of the earth has agriculture illumined with its blessings; How many firesides has it lighted up with radiant gladness; How many hearts has it made buoyant with domestic hope; How often, like the good Samaritan, has it alleviated want and misery, while the priest and the Levite of power have passed by on the other side; How many family altars, and gathering-places of affection, has it erected; How many desolate homes has it cheered by its consolations; How have its peaceful and gentle influences filled the land with plenteousness and riches, and made it vocal with praise and thanksgiving.*

—Benefits of Agriculture: D. S. DICKINSON.

*To watch the corn grow, or the blossoms set; to draw hard breath over ploughshare or spade; to read, to think, to love, to pray, these are the things that make men happy.*

—RUSKIN.

CYRUS MORE WARREN.  
*b. January 15, 1824. d.*

Harvard, L. S. S., 1855.  
 American chemist, who has made original researches in the volatile hydrocarbons, and practical applications in the use of coal-tar and asphaltum for roofing and paving purposes. He obtained patents for a process of fractional distillation, and for a method for distillation of anthracene.

*There is some soul of goodness in things evil,  
 Would men observingly distil it out.*

—Henry V., Act IV., Sc. 1: SHAKESPEARE.

*Trace science then, with modesty thy guide;  
 First strip off all her equipage of pride;  
 Deduct what is but vanity, or dress,  
 Or learning's tuxury, or idleness;  
 Or tricks to show the stretch of human brain,  
 Mere curious pleasure, or ingenious pain;  
 Expunge the whole, or lop th' excrescent parts,  
 Of all our vices have created arts;  
 Then see how little the remaining sum  
 Which served the past and must the times to come.*

—Essay on Man: POPE.

Distillation was known in very early times. Sea water was distilled for drinking in the third century.

1150.—Distilling of spirits first practiced.

1801.—Adams invented great improvements in distilling by using winding passages superheated.

1840.—Asphaltum used for paving.



1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

ANTONIO JOSE CAVANILLES.

b. *January* 16, 1745. d. *May* , 1804.

Spanish botanist. He adhered to the artificial or Linnaean system of botany. He published "Icones et Descriptiones Plantarum" (1791), and "Observations on the Natural History, Geography, etc., of Valencia" (1795-1797), which is said to be the most useful work of that kind ever published in Spain.

*Pride often guides the author's pen;  
Books as affected are as men;  
But he who studies Nature's laws,  
From certain truth his maxim draws;  
And those, without our schools, suffice  
To make men moral, good, and wise.*

—JOHN GAY.

*Let love of books, and love of field,  
And love of men combine  
To feed in turns thy mental life,  
And fan its flame divine.*

—MACKAY.

*When science from Creation's face  
Enchantment's veil withdraws,  
What lovely visions yield their place  
To cold material laws.*

1725-68.—Carl von Linnæus founded the "artificial system" in botany.

1741.—Garden at Upsala was established, Sweden.

CHARLES SHALER SMITH.

b. *January* 16, 1836. d. *December* 19, 1886.

American engineer. In 1856 he became engineer of the Louisville and Nashville Railroad, and subsequently Chief Engineer of bridges and buildings of the Wilmington, Charlotte and Rutherford Railroad in North Carolina. His name will ever be connected with the great bridges built under his supervision, hundreds in number, including four over the Mississippi River, one over the Missouri, and one over the St. Lawrence. His most important work was the practical demonstration of the uses and value of the cantilever.

*There is a perennial nobleness, and even sacredness, in work. Were he ever so benighted, forgetful of his high calling, there is always hope in a man that actually and earnestly works. In idleness alone there is perpetual despair.*

—CARLYLE.

1828.—The first steam railway in the United States (B. & O.).

1820, August 8.—First trip of a locomotive was made on the Carbondale & Honesdale R. R.

1830, August 12.—First American railroad completed; connects Albany and Schenectady.

1833.—Three hundred and eighty miles of railroad in operation in the United States.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

# JANUARY 17.

BENJAMIN FRANKLIN,

b. *January 17, 1706.* d. *April 17, 1790.*

American philosopher and statesman. In 1742 he invented the open stove. In 1752 he showed that lightning is a discharge of electricity, and invented the lightning rod.

His kite experiment confirmed the long suspected identity of lightning and electric sparks.

*"You led your Franklin to your glazed retreats,  
Your air-built castles, and your silken seats;  
Bade his bold arm invade the lowering sky,  
And seize the tip toe lightnings ere they fly,  
O'er the young Sage your mystic mantle spread,  
And wreathed the crown electric round his head."*

—Botanic Garden: DR. DARWIN.

*Franklin's quiet memory climbs to heaven,  
Calming the lightning which he hence hath riven,  
Or drawing from the no less kindred earth,  
Freedom and peace to that which boasts his birth."*

—BYRON.

1744.—Metallic electric conductors were first used.

1745.—The leyden jar was discovered.

1752.—Dalibard proved that lightning is an electrical phenomena.

1763.—Dr. Richman, Professor of Natural Philosophy at Peterburgh, was killed by a bolt of electricity while attempting Franklin's experiment of collecting electricity from the clouds.

THADDEUS FAIRBANKS.

b. *January 17, 1796.* d. *April 12, 1886.*

American inventor; invented the platform-scale, for which he received a patent, June 21, 1831.

*A monk, when his rites sacerdotal were o'er,  
In the depth of his cell with his stone-carved floor,  
Resigning to thought his chimerical brain,  
Once formed the contrivance we now shall explain:  
But whether by magic's or alchemy's powers  
We know not; indeed, 'tis no business of ours.*

\* \* \*

*Perhaps it was only by patience and care,  
At last, that he brought his invention to bear:  
In youth 'twas projected, but years stole away,  
And ere 'twas complete he was wrinkled and gray;  
But success is secure unless energy fails,  
And, at length, he produced The Philosopher's Scales.*

—The Philosopher's Scales: JANE TAYLOR.

1591 (About).—The right of inventors in arts and manufactures were secured by letters patent.

The popular idea is that inventors spend their lives in poverty and misfortune. In too many cases this is true, but not in all. The popular toy known as "Dancing Jimcrow" yielded its patentee a yearly income of \$75,000. From the sale of another toy, "John Gilpin," the inventor got \$100,000 a year. The man who first thought of putting a rubber tip on lead pencils was rewarded by an income of \$100,000 a year. The ordinary umbrella benefited six persons by as much as \$10,000,000.

1904.

SUNDAY:

1904.

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MEMORANDA AND DIARY.

# JANUARY 18.

WARREN DE LA RUE.

b. *January 18, 1815.* d. *April 19, 1889.*

English inventor and astronomer. Son of Thomas De La Rue. Entered his father's business as a card manufacturer and wholesale stationer. Here he invented a great number of new processes and machines. Among the former are processes for utilizing earth-oils, and in the latter is machinery for printing surface-coloring paper, pasting cards, and folding envelopes. He has distinguished himself by the eminent success with which he applied photography to the recording of celestial phenomena.

*He is the essence that inquires,  
He is the axis of the star,  
He is the sparkle of the spar,  
He is the heart of every creature,  
He is the meaning of each feature;  
And his mind is the sky,  
Than all it holds more deep, more high.*

—Woodnotes: EMERSON.

1554, August 3.—The first letter in Europe (known to be) sealed with sealing-wax bears this date.

1690.—William Bradford established first paper mill in America at Germantown, Pa.

1839.—Envelopes were first used in United States. Factories for making them opened.

GIOTTO.

b. . . . . d. *January 18, 1336.*

Italian shepherd, who became a painter. The favorite scholar of Cimabue. He relieved the art from many imperfections, abandoned the use of labels to distinguish the figures of a picture, and aimed at, and attained, real expression. Employed at Rome by Pope Boniface VIII. While at that city he made a ship of mosaic, which is over the portico at the entrance of St. Peter's Church, and is still known by the name of "Giotto's vessel." In 1334 he undertook the famous tower of Santa del Fiore at Florence.

*In framing artists, art hath thus decreed,  
To make some good, but others to exceed.*

—Pericles: SHAKESPEARE.

*When, seeking far the vagrant of his flock  
That from the known, familiar plain had strayed,  
The early shepherd, from a towering rock,  
The fallow world surveyed,  
He saw a land no eye had seen before,  
Beheld fair meadows threaded by bright streams,  
Then never again beside his rude tent-door  
He dreamed his simple dreams.*

—Empire: MEREDITH NICHOLSON.



1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

# JANUARY 19.

HENRY WILDE.

b. *January 19, 1833.*

d.

English electrician and inventor. Made improvements in lightning conductors and electric telegraphs. In 1864 he discovered that quantities of magnetism and electricity, indefinitely small, will induce quantities of these forces indefinitely great. To demonstrate this principle, in 1865 he constructed a dynamo, and in 1868 he discovered the property of the alternating current to control and render synchronous the rotations of the armatures of a number of dynamo machines, by which their united effect can be obtained without the use of mechanical gearing. He applied his discoveries to electric searchlight, and to generating electricity for the electro-deposition and refining of metals from their solutions (1867-1890), which have superseded the voltaic battery in the electro-plating industries. By his invention of the magnetarium he reproduced the principal phenomena of the earth's magnetism and the secular changes of the variation of the mariner's compass for a period of three centuries.

*Ethereal powers! you chase the shooting stars,  
Or yoke the vollied lightnings to your cars,  
Cling round the aerial bow with prisms bright,  
And, pleased, untwist the sevenfold threads of light;*

ANTOINE CESAR BECQUEREL.

b. *March*, 1788.

d. *January 19, 1878.*

French physicist. Distinguished for his discoveries in electro-chemistry. Among the results of his early researches were the refutation of Volta's theory of contact, and the construction of the first pile with a current. He obtained by slow electric action the metals aluminum, silicium, glucium, etc., and invented a method of electro-typing. Among his works are a "Treatise on Electro-Chemistry."

*Ye little think what toil it was to build  
A world of men imperfect even as this,  
Where we conceive of Good by what we miss,  
Of Ill by that wherewith best days are filled;  
A world where every atom is self-willed,  
Whose corner-stone is profit on artifice,  
Whose joy is shorter-lived than woman's kiss,  
Whose wisdom hoarded is but to be spilled.*  
—Pessimoptismism; LOWELL.

1831.—Seebeck discovered thermo-electricity.

1838.—Charles Page invented the induction-coil.

*Eve's silken couch with gorgeous tints adorn,  
And fire the array throne of rising Morn,  
Or, plumed with fame, in gay battalions spring,  
To brighter regions borne on broader wing.*  
—Botanic Garden: DR. DARWIN.

1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

ANDRE MARIE AMPERE.

- b. *January 20, 1775.* *d.* 1836.  
 French electrician and physicist, and the discoverer, in 1820, of the laws of dynamic electricity, upon which principles nearly all the modern applications of electricity depend. He demonstrated the influence of currents upon one another, of spiral currents upon the magnetic needle, and advanced the theory that the earth's magnetism was due to currents passing east to west about it. The unit of measurement of the quantity of electricity is named from him.

*How wonderful a being is man, when viewed in the light of his achievements. It is in the record of these that we find the evidence of his power, and the credentials of his glory. Into the results of work each generation pours its life; and, as the results grow in excellence, with broader forms, and richer tints, and nobler meanings, they become the indexes of the world's progress. We estimate the life of a generation by what it does; and the results of its work stand out in advance of its successor, to show it what it can do, and to show it what it must do, to reach a finer consummation.*

—*The Results of Work*: Dr. J. G. HOLLAND.

1819.—Oersted discovered the magnetic action of an electric current.

1820.—Argo and Davy discovered independently that a current of electricity passed through a helical conductor magnetized a steel needle placed inside the helix.

NATHAN READ.

- b. *July 2, 1759.* *d.* *January 20, 1849.*  
 Harvard, 1781.

American inventor. In 1788 he applied the steam engine to propel boats and carriages, by devising light and compact machinery. He substituted for the walking-beam the cross-head running in guides with a connecting-rod to communicate the motion. He invented the multitubular form of boiler, and a form in which the fire passed through small, straight spiral tubes on the principle of the present locomotive boiler; a regulator for windmills by accumulating the force of the wind by winding up a weight; a plan for using the energy of tides by means of reservoirs alternately filled and emptied in such a way as to produce a constant stream; several forms of pumping-engines and threshing-machines; and a plan for using the expansion and contraction of metals, multiplied by levers, for winding up clocks and for other purposes.

*Their strength the Fire, the Water gave,  
 In interleagued endeavor;  
 The mill-wheel, grappled by the wave,  
 Rolls round for aye and ever—  
 The clattering works clang night and day,  
 While down the hammer times its way,  
 And, supplied in that mighty storm,  
 Iron to iron stamps a form.*

—*Fridolin*: SCHILLER.

1904.

WEDNESDAY.

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MEMORANDA AND DIARY.

HORACE WELLS.

- b. *January 21, 1815.* d. *January 24, 1848.*  
American dentist. On December 11, 1844, while under the influence of gas, he had a tooth extracted from his own mouth without pain. Dr. William T. G. Morton received a patent for the same discovery and Wells committed suicide. Charles T. Jackson Crawford W. Long, William T. G. Morton and Horace Wells are the claimants for the discovery of anaesthesia.

*Be brave, O heart, and fear not earthly shame,  
Cry'ng not to men, but make thyself a name.  
Take up thy cross, and walk erect through life,  
Fight for the truth, however fierce the strife,  
Yield to no folly, crush thy tempting sin,  
And heed no murmur of complaint within.*  
—Take Courage.

1795.—Dr. Pearson suggested vapor of sulphuric ether for the relief of spasms.

1800.—Sir Humphrey Davy suggested the use of nitrous oxide as an anæsthetic.

1822.—Goodwin, 1832 Mitchell, 1833 Jackson, 1834 Wood and Baché showed that sulphuric ether would produce insensibility.

1844.—Anaesthesia discovered by Wells.

1846.—Dr. W. T. G. Morton used it in dentistry to prevent pain.

JOHN FITCH.

- b. *January 21, 1743.* d. *June or July, 1798.*  
American inventor of steamboat, on a reduced plan, in 1785. He conceived the idea of steam as a motive-power April 15, 1785. His second boat made its trial-trip on the Delaware River, August 22, 1787.

*Divine inventors of the useful arts :  
All those whose generous and expansive hearts,  
By goodness sought to purchase honest fame ;  
And dying left behind a deathless name.*

*The Ocean pales wher'e'er I sleep,  
To hear my strength rejoice,  
And the monsters of the briny deep,  
Cower, trembling, at my voice.  
I carry the wealth and the lord of the earth,  
The thoughts of the godlike mind,  
The wind lags after my going forth,  
The lightning is left behind.*  
—Steamboat : BRYANT.

1752.—The screw ship-engine was invented by Daniel Bernoulli.

1818.—First line of steam packets on Long Island Sound between New York and New-Haven.

1840.—The first ship of the Cunard line, the "Britannia," crossed from Liverpool to Boston in fourteen and one-half days.

1854.—The first trip ever made around the world by a steam vessel was made by the "Argo," a merchant vessel.

1855.—First vessel from Milwaukee to Europe via the Welland Canal, Great Lakes, and St. Lawrence River.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.



# JANUARY 22.

GEORGE GORE.

b. *January 22, 1826.*

d.

English electro-metallurgist. Almost entirely self-educated. He made discoveries in physics and chemistry, and many original electrical researches. He is distinguished by his discoveries in, and writings upon, electro-chemistry, electro-metallurgy, and chemistry. He made experiments in the highly dangerous substance, anhydrous hydrofluoric acid and the fluorides, and discovered explosive antimony. His original observation of the discolorising effect of chlorine water on crude phosphorus gave rise to the present mode of bleaching that substance, and his solution for electro-depositing nickel (1856) was the first commercially employed in electroplating articles with nickel. He is the author of "The Art of Electro-Metallurgy" (1877); "The Art of Scientific Discovery" (1878); "Electro-Chemistry" (1885); and "The Art of Electrolytic Separation and Refining of Metals" (1890).

*The glorious sun*

*Stays in his course, and plays the alchymist;  
Turning, with splendour of his precious eye,  
The meagre cloddy earth to glittering gold.*

—King John: SHAKESPEARE.

CALVIN LUTHER GODDARD.

b. *January 22, 1820.*

d.

Yale, 1845.

American inventor. Patented solid packing burring machines and devised several valuable improvements for the carding machine. He patented feed-rolls as an attachment to the carding machine; also steel ring feed-rolls, with adjustable stands and spring boxes.

*Swiftly turn the murmuring wheel!  
Night has brought the welcome hour,  
When the weary fingers feel  
Help as if from the fairy power;  
Dewy night d'ershades the ground,  
Turn the swift wheel round and round.  
Now beneath the starry sky  
Rest the widely scattered sheep;  
Ply the pliant labor, ply,  
For the spindle while they sleep,  
With a motion smooth and fine,  
Gathers up a trustier line.*

*Get, if you can, into one of the main  
grooves of human affairs. It is all the difference  
of going by railway, and walking over a ploughed  
field, whether you adopt common courses or set up  
one for yourself.*

—SIR ARTHUR HELPS.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

# JANUARY 23.

JABEZ CONEY.

- b. 1805. *d. January 23, 1872.*  
American manufacturer. Constructed the first iron vessel ever built in New England, the first large marine engine and the first gravel excavator.

*The useful arts are but reproductions or new combinations, by the art of man, of the same natural benefactors. He no longer waits for favoring gales, but by means of steam he realizes the fable of Aeolus's bag, and carries the two-and-thirty winds in the boiler of his boat.*

—EMERSON.

*Labor, diving into the solid earth, brings up its long-hidden stores of coal, to feed ten thousand furnaces and in millions of inhabitations to defy the winter's cold. Labor explores the rich veins of deeply-buried rocks, extracting the gold, and silver, and copper and the tin. Labor melts the iron, and moulds it into a thousand shapes, for use and ornament, from the massive pillar to the tiniest needle, from the ponderous arches to the wire-gauze, from the mighty fly-wheel of the steam-engine to the polished purse-ring or the glittering bead.*

—Labor: REV. NEWMAN HALL.

1652.—First iron forge set up in Raynham, a town of the Plymouth colony.

1819.—First steamer to cross the Atlantic was the "Savannah."

1860.—John Fritz, former manager of a blast furnace and of the Cambria Steel Company, began the erection of the Bethlehem Steel Company's plants.

WILLIAM BAFFIN.

- b. 1584. *d. January 23, 1622.*  
English navigator. The first to determine longitude by observing the moon's culmination, July 8, 1612. Baffin's Bay is named after him.

*Work away!*

*For the Leader's eye is on us,*

*Never off us, still upon us,*

*Night and day!*

*Wide the trackless prairies round us,*

*Dark and unsunned woods surround us,*

*Sleep and savage mountains bound us;*

*Far away*

*Smile the soft savannahs green,*

*Rivers sweep and roll between;*

*Work away!*

—*Work Away: HARPER'S MAGAZINE.*

*Tall navies hence their doubtful way explore,*

*And every product waft from every shore;*

*Hence meagre want expell'd, and sanguine strife,*

*For the mild charms of cultivated life.*

—BLACKLOCK.

1615.—Baffin discovered the bay named after him.

1845-1847.—Arctic expedition of Sir John Franklin and discovery of northwest passage.

1850-1854.—McClure discovered a northwest passage.

1859.—Franklin's fate discovered by Captain McClintock.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

# JANUARY 24.

HEINRICH GEISSLER.

- b. 1814. *d. January 24, 1879.*  
German physicist. He was a glass-blower, and was known for the ingenuity of his physical apparatus and for his knowledge of physical science. He was the first to make vacuum tubes (1855).

*Thus the slight wound, engraved on glass unmealed,  
Runs in white lines along the lucid field;  
Crack follows crack, to lewis elastic just,  
And the frail fabric shivers into dust.*

—Botanic Garden: DR. DARWIN.

"To be employed," said the poet Gray, "is to be happy," "it is better to wear out than rust out," said Bishop Cumberland. "Have we not all eternity to rest in?" exclaimed Arnauld.

—SAMUEL SMILES.

*Sloth makes all things difficult, but Industry all easy; and he that riseth late must trot all day, and shall scarce overtake his business at night; while laziness travels so slow that poverty soon overtakes him.*

—BENJAMIN FRANKLIN.

- 79 B. C.—Glass was discovered in Syria. In the ruins of Pompeii glass windows were found.  
653.—Glass rediscovered.  
674.—Glass was in use in England.  
1609.—Glass was manufactured at Jamestown, Va.  
1780.—First regular factory in U. S., at Temple, N. H.

JAMES P. ESPY.

- b. May 9, 1785. *d. January 24, 1860.*  
American meteorologist. He advanced the theory that every atmospheric disturbance begins with the uprising of air which has rarefied by heat; he instituted a service of daily bulletins, in conjunction with the newspapers and the telegraph companies, on the condition of the weather in different localities. This constituted the earliest efforts of the weather bureau. He was sometimes called the "Storm King." He published "Philosophy of Storms" (1841).

*Mysterious even in open day,  
Nature retains her veil, despite our clamors;  
That witch she doth not willingly display  
Cannot be wrenched from her with levers, screws, and hammers.*

*He is come! He is come! do ye not behold  
His ample robes on the wind unrolled?  
Giant of air! we bid thee hail!  
How his gray skirts toss in the whirling gale;  
How his huge and availing arms are bent,  
To clasp the zone of the firmament,  
And fold, at length, in their dark embrace,  
From mountain to mountain the visible space.*

—The Hurricane: BRYANT.

The invention of the vane, or weathercock, must have been of very early date. Vetrivius calls it "triton."

1904.

SUNDAY.

1904.

MEMORANDA AND DIARY.

ROBERT BOYLE.

b. *January 25, 1627.* d. *December 30 or 31, 1691.*

Irish chemist and philosopher. Discovered that life and flame could not survive in a vacuum. He first distinguished a mixture from a compound, and was also first to define an element and to use litmus for acidity and alkalinity. He first rendered the air-pump available for experiment, and discovered the law of gaseous elasticity; he constructed the first hermetically sealed thermometers made in England. He, with von Guericke, proved that a piece of rubbed amber, which attracted other bodies to itself, was in turn attracted by a body brought near it.

*You charm'd indulgent Sylphs : their learned toil,  
And crowned with fame your Torricell and Boyle ;  
Taught with sweet smiles, responsive to their prayer ,  
The spring and pressure of the viewless air .  
How up exhausted tubes bright currents flow  
Of liquid silver from the lake below,  
Weigh the long column of the incumbent skies,  
And with the changeful moment fall and rise .  
How, as in brazen pumps the pistons move,  
The membrane valve sustains the weight above ;  
Stroke follows stroke, the gelid vapor falls,  
And misty dew drops dim the crystal walls :  
Rare and more rare expands the fluid thin,  
And Silence dwells with Vacancy within .  
So in the mighty Void with grim delight  
Primeval Silence reigns with ancient Night .*

—Botanic Garden; DR. DARWIN.

JUSTUS MITCHELL SILLMAN.

b. *January 25, 1842.* d.

Rensselaer, 1870.

American mining engineer. He invented an instrument for orthographic, clinographic and crystallographic projection; also a water manometer and anemometer. His work includes an examination of the Bessemer flame with colored glasses and the spectroscope.

*Adored Artificer : what skill divine,  
What wonders, in the wide creation shine ?  
Hence orient Nitre owes its sparkling birth,  
And with prismatic crystals gems the earth,  
O'er tottering domes in filmy foliage crawls,  
Or frosts with branching plumes the mouldering walls !*

*Hence with diffusive salt old Ocean steep's  
His emerald shallows, and his sapphire deeps,  
Oft in wide lakes around their warmer brim,  
In hollow pyramids the crystals swim ;  
Or fused by earth-born fires in cubic blocks,  
Shoot their white forms and harden into rocks.*

1713.—Savery and Newcomen invented an atmospheric engine.

1769.—James Watt received his first patent for a steam-engine. Renewed in 1775.

1778.—James Watt invented the expansion engine. Also a copying machine in 1780.

1827.—The first successful atmospheric engine was invented by John Ericsson.



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MEMORANDA AND DIARY.

# JANUARY 26.

EDWARD JENNER.

- b. *May 17, 1749.* d. *January 26, 1823.*  
English physician, who introduced vaccination into this country, January 21, 1799. When its merits were known, Jenner became famous. He wrote "Observations on the Natural History of the Cuckoo;" also two works on the "Cow Pox."

*Within this tomb hath found a resting place  
The Great Physician of the human race—  
Immortal Jenner! Whose gigantic mind  
Brought life and health to more than half mankind.  
Let rescued infancy his worth proclaim,  
And tisp out blessings on his honoured name;  
And radiant Beauty drop her saddest tear,  
For Beauty's truest, truest friend lies here,  
—Epitaph placed upon Jenner's tomb.*

- 219 B. C.—The art of surgery introduced.  
1796, May 14.—Important principles established conclusively.  
1798, January 3.—Vaccination discovered.  
1881, October 1.—Louis Pasteur had successfully vaccinated 68,900 sheep up to this date.  
1884, August.—Louis Pasteur discovered a method for mitigating the effect of hydrophobia, analogous to vaccination. He experimented successfully upon dogs.

HENRY BRIGGS.

- b. *February*, 1560–1. d. *January 26, 1630.*  
English mathematician; first suggested logarithmic tables with ten for their base, and made the tables therefor in 1624.

*If a man's wit be wandering, let him study the mathematics; for in demonstrations, if his wit be called away never so little, he must begin again.*

—BACON.

*Law governs the sun, the planets, and the stars.  
Law covers the earth with beauty, and fills it with bounty.  
Law directs the light, and moves the wings of the atmosphere: binds the forces of the universe in harmony and order, awakens the melody of creation, quickens every sensation of delight, moulds every form of life.*

—TAPPAN.

- 1200.—Leonardo of Pisa introduced the notation of numbers in use at present, by combining ten digits according to the position-system. This position-system originated with the Hindus and came to Europeans through the Arabs.  
1482.—Arithmetic of decimals was invented.  
1614.—Logarithms were introduced by Napier.  
1664.—Sir Isaac Newton discovers the Differential Calculus, or method of fluxions. Discovered about the same time by Leibnitz.

1904.

TUESDAY.

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MEMORANDA AND DIARY.

HENRY GREATHEAD.

- b. *January 27, 1757.* d. 1816.  
English inventor of the life-boat. He built the first one, which was put to sea January 30, 1790.

*Each petty hand  
Can steer a ship becalm'd; but he that will  
Govern and carry her to her ends, must know  
His tides, his currents, how to shift his sails;  
What she will bear in foul, what in fair weathers;  
Where her springs are, her leaks, and how to stop them;  
What straits, what shelves, what rocks do threaten her;  
The forces and the natures of all winds,  
Gusts, storms and tempests; when her keel ploughs hell,  
And deck knocks heaven, then to manage her  
Becomes the name and office of a pilot.*

—JONSON'S CATILINE.

*Speed, speed the life-boat! Off she goes!  
We'll pulled, ye oarsmen brave!  
Hurrah! Now hark! you sailed bark  
Has human lives within her,  
And dearer than gold is the wealth untold  
They'll save if they can win her.  
On, life-boat! Speed thee, life-boat!*

- 1785.—Lionel Lukin was granted a patent for a life-boat.  
1802.—Life-boats first invented.

1808, February.—A life-saving apparatus invented by Capt. Manby was brought into use. Communication with the distressed vessel was effected by a rope fastened to a shot, thrown from a mortar.

HEINRICH ROSE.

- b. 1795. d. *January 27, 1864.*  
German chemist. He was distinguished as a practical analyst in inorganic chemistry. He discovered in 1844 the substance called Nilbium, and Pelopium in 1845. His principal work is "Manual of Analytical Chemistry" (1851).

*Why has not man a microscopic eye?  
For this plain reason: man is not a fly.  
Say: what the use, were finer optics given,  
To inspect a mite, not comprehend the heaven?*  
—POPE.

*You then taught transuding dew to pass,  
Through time-fallen woods, and root-inwove morass,  
Age after age: and with filtration fine  
Dispart, from earth and sulphurs, the saline.*  
—Botanic Garden: DR. DARWIN.

- 1150.—The Moors introduced the study of chemistry in Spain.  
1820.—First importation of nitrate of soda into England; thrown overboard for want of a purchaser.

1830.—Second importation.

1838.—The ammonia process of making soda was invented by Dyer and Hemming.

1857.—Potash deposits discovered at Strassfurth, Germany.

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MEMORANDA AND DIARY.

# JANUARY 28.

SIR HENRY MORTON STANLEY.

PETER THE GREAT.

b. January 28, 1840. d.

b. June 9, 1672.

d. January 28, 1725.

English explorer. He was reared in a poorhouse, and when fifteen years old he went to sea. As a correspondent of the "New York Herald" he accompanied the British army to Abyssinia in 1867, and in 1871-1872 conducted an expedition into Africa in search of Livingston, whom he found at Ujiji. He revisited Africa in 1874 to rescue Livingston, but, hearing of his death, he crossed the continent, descended the Congo, and returned to England in 1878. He went to Africa in 1879-1882 to open the country to commerce and civilization. Among the important geographical discoveries were the Semliki River, Mt. Ruvenzori, Lake Albert Edward, and the southwestern extension of Lake Victoria.

*The sun is sinking over Africa;  
And under shadowy native eaves reclines  
A traveller upon a fur-strewn floor;  
I hunger till I pass your mighty doors,  
And lay my hand upon the Mystery.  
—The Nile, Africa, and Egypt: RODEN NOEL.*

*Ye mountains, hiding undiscover'd worlds,  
So misad in spirit the lone wanderer,  
I hunger till I pass your mighty doors,  
And lay my hand upon the Mystery.*

1872, March 14.—Stanley found Livingston.

Czar of Russia. Crowned-shipbuilder. Under a disguise he worked in shipyards and became an expert shipwright, sailor, pilot, and commander. He changed the manners, customs, and laws of the Russians, and lives in their memory as the father of their country.

*A people savage from remotest times,  
A huge neglected empire, one vast mind,  
By Heaven inspired, from Gothic darkness called.  
Immortal Peter! first of monarchs! he  
His stubborn country tamed, her rocks, her fens,  
Her floods, her seas, her ill-submitting sons;  
And while the fierce barbarian he subdued,  
To more exalted soul he raised the man.  
Ye shades of ancient heroes, ye who toiled  
Through long successive ages to build up  
A labouring plan of state, behold at once  
The wonder done! behold the matchless prince!  
Who left his native home, where reigned till then  
A mighty shadow of unreal power;  
Who greatly spurned the slothful pomp of courts;  
And, roaming every land, in every port  
His sceptre laid aside, with glorious hand,  
Unwearied plying the mechanic tool;  
Gathered the seeds of trade, of useful arts,  
Of civil wisdom, and of martial skill.*

—THOMSON.

1682.—Peter and Ivan crowned joint rulers of Russia.  
1689.—Peter's public entry into Moscow.

1904.

THURSDAY.

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MEMORANDA AND DIARY.



# JANUARY 29.

WILLIAM FERREL.

b. January 29, 1817. d. September 18, 1891.

American astronomer and meteorologist. He developed a theory of the gyroscope or rotascope; of vision and of the stereoscope; of the irregularity in the period of Algol, and of radiation. He filled out Newton's and Laplace's tidal theories, and announced the retardation of the earth's rotation. He has done more than any other single person to establish on firm foundations the mechanics of meteorology. He invented the maxima and minima tide-predicting machine. He has written "Motions of Fluids and Solids Relative to the Earth's Surface" (1859); "Tidal Researches" (1874), and "Temperature of the Atmosphere and the Earth's Surface" (1884).

*Say, why should the collected main  
Itself within itself contain?  
Why to its caverns should it sometimes creep  
And with delighted silence sleep  
On the low'd bosom of its parent deep?  
Why should its numerous waters stay  
In comely discipline and fair array,  
Till winds and tides exert their high commands?  
Then prompt and ready to obey,  
Why do the rising surges spread  
Their op'ning ranks o'er earth's submissive head,  
Marching through different paths to different lands?*  
—PRIOR.

400 B. C.—An areometer was invented in Alexandria.

SIMEON BORDEN.

b. January 29, 1798. d. October 28, 1856.

American civil engineer and inventor. In 1830 he devised and constructed an apparatus for measuring the base line of the trigonometrical survey of Massachusetts. Later he was engaged in the construction of railways. In 1851 he accomplished the feat of stringing a telegraph wire across the Hudson River from the Palisades to Fort Washington.

*He rends the oak, and bids it ride  
To guard the shores its beauty graced;  
He smites the rock—upheaved in pride,  
See towers of strength and domes of taste.  
Earth's teeming caves their wealth reveal;  
Fire bears his banner on the wave,  
He bids the mortal poison heal,  
And leaps triumphant o'er the grave.*  
—GENIUS SLUMBERING; PERCIVAL.

*Reason's comparing balance rules the whole,  
Man, but for that, no action could attend,  
And but for this, were active to no end;  
Fix'd like a plant on his peculiar spot,  
To draw nutrition, propagate and rot;  
Or, meteor-like, flame lawless through the void,  
Destroying others, by himself destroy'd.  
Most strength the moving principle requires;  
Active its task, it prompts, impels, inspires.*  
—ESSAY ON MAN; POPE.

1816, August 6.—U. S. Coast and Geodetic surveys were begun by F. R. Hasler.

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MEMORANDA AND DIARY.

SEARS COOK WALKER.

b. *March 28, 1805.*

*d. January 30, 1853.*

American mathematician. He built in 1837 the first observatory of importance in the U. S. On Feb. 2, 1847, four months after the discovery of Neptune, he identified it with a star observed by Lalande, in May, 1795. With Prof. Alexander D. Bache he determined differences of longitude by telegraph (1849), and he introduced the chronograph for recording observations. His parallactic tables (1834) simplified the computations of the phases of an occultation. He published "Periodical Meteors of August and November" (1841); "Researches Relative to the Planet Neptune" (1850); and "Ephemeris of the Planet Neptune for 1848-'52" (1852).

*In your astronomical studies, the Earth on which you dwell will stand forth in space a suspended ball, taking its place as one of the smallest of the planets, and like them, pursuing its appointed path—the arbiter of times and seasons. Beyond our planetary system, now extended, by the discovery of Neptune, to nearly three thousand millions of miles from the sun, and throughout the vast expanse of the universe, the telescope will exhibit to you new suns and systems of worlds, infinite in number and variety, sustaining, doubtless, myriads of living beings, and presenting new spheres for the exercise of divine power and beneficence.*

—Science and Art: D. BREWSTER.

ALHAZEN.

b.

*d. about 1038.*

Arabian philosopher and mathematician. He was the first to correct the Platonic theory that rays of light are emitted by the eye. He discovered atmospheric refraction, and that we see the moon after it has set. He was aware that the atmosphere decreased in density with the height, and actually fixed its height at  $58\frac{1}{2}$  miles. He showed that weights differed in a rare and a dense atmosphere. He understood center of gravity, and applied it to balances and steelyards. He recognized gravity as a force, though he made it diminish as the distance, and made it purely terrestrial. He had laws of falling bodies, and ideas of capillary attraction. He wrote "Optical Thesaurus," published in Latin in 1572.

*Friend: the Great Ruler, easily content,**Needs not the laws it has laborious been**The task of small professors to invent;**A single wheel impels the whole machine**Matter and spirit: yea, that simple law,**Permeating nature, which our Newton saw.**This taught the spheres, slaves to one golden rein,**Their radiant labyrinths to weave around**Creation's mighty hearts: this made the chain,**Which into interwoven systems bound**All spirits streaming to the spiritual sun,**As brooks that ever into ocean run.*

—Friendship: SCHILLER.

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MEMORANDA AND DIARY.

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ENOS STEVENS.

b. *January 23, 1816.* d. *January 31, 1877.*

Middlebury, 1838.

American inventor of a system of musical notation, apparatus for automatically recording atmospheric changes, an instrument for phrenological measurements, and a legislative teller that was put in use by Congress in 1853. He originated an astronomical theory of weather indications, and published pamphlets on astronomy, music, phrenology, and agriculture.

*New hope inspires him, new ardor burns :*

*Secret, he meditates his art by day :*

*By night fair phantoms o'er his fancy stray ;*

*With opening morn they rush upon his soul,*

*Nor cares, nor duties, banish nor control.*

—Botanic Garden : DR. DARWIN.

*It was Music by which mankind was humanized,  
What speech cannot impart to the unwillful and  
hardened is readily received from words on wings of  
lovely sound.*

—HERDER.

*Musick! soft charm of heav'n and earth,*

*Whence didst thou borrow thy auspicious birth ?*

*Or art thou of eternal date,*

*Sire to thyself, thyself as old as Fate.*

—EDMUND SMITH.

GUIDO ARETINE.

b. *about 995.*

d.

1050.

A monk of Arezzo, who flourished about 1024. He invented points and rhombuses, and introduced the use of five parallel lines upon and between which he wrote notes of music, 1024. The seven letters formerly used as notes now became clefs. He is the alleged inventor of the musical gamut.

*Music remains the universal language of nature ;  
it speaks to us in wonderful and mysterious tones ;  
in vain do we try to retain its effect by signs, for any  
artificial connecting of the hieroglyphs results after  
all only in indicating the idea of that which we have  
heard.*

—E. T. A. HOFFMANN.

*The idea of an artificial tone system is thoroughly  
incompatible with our reason ; a regular tone system  
has no more been invented by the musicians than poets  
invented the words of their language and the gram-  
matical combinations of those words.*

—DR. HAUPTMANN.

1028. — Musical notes invented.

1390. — Music as now used, invented.

1350-1394. — Dufay, Okeghem, Josquin des Pres, Willaert and Orlando di Lasso developed the art of counter-point, the simultaneous combination of two or more melodies together.

1501. — Music printed from movable types.

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MEMORANDA AND DIARY.

## FEBRUARY 1.

MATTHEW FONTAINE MAURY.

b. *January 14, 1806.* *d. February 1, 1873.*

American scientist. He advanced the enlargement of the Illinois and Michigan Canal; suggested to Congress plans for the disposition of the drowned public lands along the Mississippi; instituted a system of deep-sea sounding, and first suggested the establishment of telegraphic communication between the continents by cable on the bed of the ocean. The existing cable is laid after the manner indicated by him.

*Glory to God above!*

*The Lord of Life and love!*

*Who makes His curtains clouds and waters dark;*

*Who spreads His chambers on the deep,*

*While all its armies silence keep;*

*Whose hand of old, world-rescuing, steered the bark;*

*And now has guided safe a grander Bark;*

*Who, from her iron loins,*

*Has spun the thread that joins*

*Two yearning worlds made one with lightning spark.*

*—The Atlantic Telegraph: REV. GEORGE L. TAYLOR.*

1857, Aug. 5.—Laying of Atlantic Cable commenced at Valentia, Ireland.

1858, Aug. 5.—The Atlantic Cable was successfully laid.

1866.—Atlantic Cable successfully re-laid.

1869.—The European end of the French Atlantic Cable was laid at Brest.

PIERRE PAUL RIQUET.

b. 1604. *d.* 1680.

Projector and engineer of the Languedoc Canal, commenced 1667 and finished about 1680.

*Here lies the man who overcame the difficulties of this bold design,  
Who united the waters of the two seas,*

*Opened the bosom of the earth, levelled mountains,*

*Caused the waves to obey the commands of the king,*

*And who forever never failed in truth, as did Moses.*

*Nevertheless, their fates were somewhat similar:*

*One died in sight of the promised land;*

*The other, just before the completion of his canal.*

*—Epitaph to Riquet: M. DE CASSANIS.*

*Poor Machiavel! who labor'd hard his plan,*

*Forgot, that genius needs not go to school;*

*Forgot, that man, without a tutor wise,*

*His plan had practis'd, long before 'twas writ.*

*The world's all tittle page, there's no contents;*

*The world's all face; the man who shows his heart,*

*Is hooded for his nudities, and scorn'd.*

*—Night Thoughts—The Complaint: YOUNG.*

1804.—The first canal in the United States, Boston to Concord River, the Middlesex, built.

1817, July 4.—Construction of Erie Canal begun by breaking ground near Rome.

1821.—The Welland Canal was commenced. It was opened for navigation 1829, Apr. 16.

1894, Nov. 21 (about).—Survey of route for proposed 22-foot ship canal from Lake Superior through White Birch to the Mississippi River was completed.



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MEMORANDA AND DIARY.

## FEBRUARY 2.

LOUIS FERRARI.

b. *February* 2, 1522. d. 1562.

Italian mathematician, and a pupil of Cardan. He discovered the method of resolving biquadratic equations.

*Every moment instructs, and every object: for wisdom is infused into every form. It has been poured into us as blood; it convulsed us as pain; it slid into us as pleasure; it enveloped us in dull, melancholy days, or in days of cheerful labor; we did not guess its essence until after a long time.*

*Watch with nice eye, the steady rolling sphere,  
The Equinoctial and Sideral year;  
The slow Procession, and the varying clime,  
And trace with patient care the flight of Time.*

*Ye stars! which are the Poetry of Heavens!*

—LORD BYRON.

1460.—The decimal system in arithmetic was worked out by Johann Regiomontanus.

1585.—Simon Stevin of Bruges invented decimal fractions as now in use.

1616.—The decimal point occurred in Napier's logarithmic tables.

1676.—Von Leibnitz discovered the infinitesimal calculus.

1751.—Philadelphia. David Rittenhouse (19 years old) discovered a method of fluxions.

ARYABHATTA, OR ARYABAHU.

b. 476. d. 550.

Hindoo mathematician and astronomer. Earliest known algebraist. He announced the diurnal rotation of the earth, and made a near approximation to the earth's diameter. He wrote Aryabhattiya.

*The truest test of civilization is not the census or the size of cities, nor the crops—no, but the kind of men the country turns out.*

—EMERSON.

*New forms are shaped out of new found law!*

*And, after the tempest of the mind,*

*There where confusion stormed, we find*

*That things that were not—are.*

*Before the wond'ring eyes*

*The fair creations rise,*

*And even seasons new*

*Come into view,*

*And all their teeming treasures bring*

*With this first bud of another spring*

—*Ode on the Great Exhibition, 1850.*

1540.—Robert Record used the sign of equality.

1540-1603.—Franciscus Vieta used + and - signs.

1553.—Michael Stifel used the radical sign.

1631.—William Oughtred introduced the symbol of multiplication and of proportion.

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MEMORANDA AND DIARY.

## FEBRUARY 3.

OGDEN NICHOLAS ROOD.

*b. February 3, 1831.*

*d.*

Princeton, 1853.

American physicist. He was one of the first to apply photography to the microscope, and to take binocular pictures with that instrument. In 1880 he devised a mercurial air-pump giving an exhaustion of 1/388 millionth of an atmosphere, not therefore obtained by other pumps. The methods of photometry that he originated and his investigations of phenomena that depend on the physiology of vision are ingenious; he first made quantitative experiments on color contrast.

*The smallest bark on life's tumultuous ocean,*

*Will leave a track behind for evermore;*

*The lightest wave of influence once in motion,*

*Extends and widens to the eternal shore.*

*We should be wary then, who go before.*

*A myriad yet to be, \* \* \* one mistake*

*May wreck unnumbered barks that follow in our wake.*

—INFLUENCE; SARAH T. BOUTON.

*Law governs atoms and governs systems. Law governs matter and governs thought. Law springs from the mind of God, travels through creation, and makes all things one. It makes all material forms one in the unity of system; it makes all minds one in the unity of thought and love.*

—TAPPAN.

1665.—Robert Boyle experimented on air, discovered its elasticity, and improved the air-pump.

SPENCER FULLERTON BAIRD.

*b. February 3, 1823.*

*d. August 19, 1887.*

Dickinson, 1840.

College of Physicians and Surgeons, 1842.

American naturalist who wrote on fisheries. His works include the editing and translation of the "Iconographic Encyclopedia" (New York, 1852); "The Birds of North America," with John Cassin (Philadelphia, 1860); "Mammals of North America" (Philadelphia, 1859); and "Review of American Birds in the Museum of the Smithsonian Institution" (1864). He edited the annual reports of the Smithsonian Institution, and reports of the U. S. Commission of Fish and Fisheries.

*The sounds and seas, each creek and bay,*

*With fry innumerable swarm, and shoals*

*Of fish that with their fins, and shining scales,*

*Glide under the green wave, in skulks that oft*

*Bank the mid sea. Part single, or with mate,*

*Grazed the sea-weed their pasture, and through groves*

*Of coral stray; or, sporting with quick glance,*

*Show to the sun their waved coats dropt with gold.*

—MILTON.

900 A. D.—Herring fisheries were encouraged by the Scotch.

1390.—Herring was preserved by pickling, and the herring fishery became a branch of commerce.

1440.—The herring fisheries made Holland by the discovery of the curing process. "The foundation of Amsterdam is laid in herring-bones."

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MEMORANDA AND DIARY.

## FEBRUARY 4.

CYRUS ALGER.

*b. November 11, 1781. d. February 4, 1856.*

American inventor. In 1817 he founded the South Boston Iron Company. He supplied the government with cannon balls during the War of 1812. The first gun ever rifled in America was made at his works in 1834, and the first perfect bronze cannon was made at his foundry. His mortar "Columbiad," the largest gun of cast-iron that had at that time been made in the United States, was cast under his personal supervision. He made improvements in time fuses for bomb shells and grenades; in 1811 he patented a method of making cast-iron chilled rolls, and in 1822 first designed cylinder stoves.

*Her sacred cause shall all our art engage,  
The noblest arms our potent skill can frame,  
With breathing bellows, or the forming flame,  
Or polished steel, reluctant to behold,  
Or mingled metals, damasked o'er with gold,  
Shall grace the Chief.*

—PITT.

*But the hero that wars in the Battle of Life  
Must stand alone in the fearful strife—  
Alone in his weakness or strength must go,  
Hero or coward, to meet the foe;  
He may not fly; on that fatal field  
He must win or lose, he must conquer or yield.*

—ANNE C. LYNCH.

1687.—A Venetian bomb destroyed the roof and most of the walls of the Parthenon.

1861, July.—The first steel cannon in the United States was made at Trenton, N. J.

CHARLES DE LA COUDAMINE.

*b. January 28, 1701. d. February 4, 1774.*

French astronomer. A martyr to science. In 1735, with Bouguer, he went to Peru to measure an arc of the equator. He returned in 1743, and later published the results. He adopted the length of the seconds pendulum as an invariable unit of measure. He died while under an operation for a malady contracted in Peru. Some of his works are "Distance of Tropics," "Relation of a Voyage to America," and "Measure of the First Three Degrees of the Meridian."

*Were a star quenched on high,  
For ages would its light,  
Still traveling downward from the sky,  
Shine on our mortal sight.*

*So when a great man dies,  
For years beyond our ken,  
The light he leaves behind him lies  
Upon the paths of men.*

—LONGFELLOW.

*There is a thing sadder than being poor—it is to have been rich;  
Sadder than being plain—to have been pretty;  
Sadder than being scorned—to have been loved;  
And sadder than being unknown—to be forgotten.*

230 B. C.—Eratosthenes laid down the first parallel of latitude; he also attempted to measure the magnitude of the earth.

1691.—Halley's method of measuring the sun's distance by the transit of Venus appeared.

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THURSDAY.

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MEMORANDA AND DIARY.

## FEBRUARY 5.

HIRAM STEVENS MAXIM.

*b. February 5, 1840.*

*d.*

American inventor. In 1877 he studied electric dynamos, machines and lamps, in the U. S. He first made incandescent lamp-carbons by the process known as "flashing." He invented the first electric current regulator for electric lamps. In 1884 he developed the first automatic gun. He invented a smokeless powder, and in 1889 an aeroplane propelled by twin screws. He was knighted by Queen Victoria shortly before her death.

*We'll go through air; for sure the air is free.  
Then to new arts his cunning thought applies,  
And to improve the work of nature tries.  
A row of quills in gradual order plac'd,  
Rise by degrees in length from first to last;  
As on a cliff th' ascending thicket grows,  
Or, different reads the rural pipe compose.  
Along the middle runs a twine of flax,  
The bottom stems are join'd by pliant wax.*

—Metamorphoses; OVID.

1811.—The first breech-loading gun was made at North Yarmouth, Mass.

1881.—The gun as a fire arm was known at Augsburg.

1483.—The arquebus came into use.

1807, Apr.—The Rev. Mr. Foreythe patented the percussion method of igniting gunpowder in muskets.

1820.—Percussion-caps were invented by Bellot of Paris.

ALEXANDRE BRONGNIART.

*b. February 5, 1770.*

*d. October 7, 1847.*

French chemist and mineralogist. In about 1800 he was director of the manufactory of porcelain at Sevres. He is said to have first classified reptiles under the heads of Saurians, Batrachians, Chelonians and Ophidians.

He wrote an "Elementary Treatise on Mineralogy" (1807) and "A Treatise on the Art of Pottery" (1845).

*First China's Sons with early art elate,  
Formed the gay Tea pot, and the pictured Plate,  
Sawp with illumina'd brown and dazzled eyes  
In the red stove vitrescent colours rise;  
Speck'd her tall beakers with enamel'd stars,  
Her monster-josses and gigantic jars;  
Snear'd her huge dragons with metallic hues,  
With golden purples, and cobaltic blues;  
Bade on wide hills her Porcelain castles glare,  
And glazed pagodas tremble in the air.*

—Botanic Garden; DR. DARWIN.

*His foot upon the treadle as he deftly turned the wheel;  
His hands deep buried in the clay with fingers quick to feel  
And fashion with dexterity true art without a blot—  
Ah wondrous work to look upon, the potter and his pot.*

—Dedicated to GEORGE E. OHR.

1513.—The manufacture of porcelain introduced into Hezin, Japan, from China.

1513.—China porcelain first mentioned and introduced into England.

1706.—Porcelain made at Dresden.



1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 6.

NICOLAUS ZININ.

- b. *August 25, 1812.* *d. February 6, 1880.*  
 Russian chemist. The production of aniline as a commercial product only became practicable when he showed, in 1842, it could be produced by the reduction of nitro-benzine.

*Of all unhappy deserters from the paths of Science, none seemed less able to return than the followers of Indolence. The captives of Appetite and Passion would often seize the moment when their tyrants were languid or asleep, to escape from their enchantment; but the dominion of Indolence was constant and unremitting, and seldom resisted till resistance was vain.*

—AIKEN.

*The starving chemist in his golden views  
 Supremely blest.*

—*Essay on Man*: POPE.

*Go laugh—transmuting imps into angels by the  
 alchemy of smiles.*

—ALCOTT.

- 1811.—Manufacture of chemicals begun in New England.  
 1825.—Faraday discovered benzin in oils.  
 1837.—Pelletier and Walter discovered toluene.  
 Victor Meyer and Kries discovered thiotolene.  
 Thениus discovered coridine, subidine and viridine.

CHRISTOPH CLAVIUS.

- b. 1537. *d. February 6, 1612.*  
 German mathematician. Employed by Gregory XIII. in the reformation of the Calendar.

*Behold*

*How short a span*

*Was long enough of old,*

*To measure out the life of man!*

*In those well-tempered days his time was then*

*Surveyed, numbered, and found but threescore years and ten.*

—*The Brevity of Human Life*: QUARLES.

*Time should not be allowed to pass without yielding fruits in the form of learning something worthy of being known; some good principle cultivated, or some good habit strengthened.*

*What a solemn and striking admonition to youth is that inscribed on the dial at All Souls, Oxford—"Perit, et impunitur"—The hours perish and are laid to our charge. Time is the only little fragment of eternity that belongs to man; and like life, it can never be recalled.*

265 B. C.—The solar year was found to comprise 365 days, 5 hours, 48 minutes, 51 seconds and 6 decimals.

710 B. C.—Roman calendar reformed and the year divided into 12 months instead of 10.

713 B. C.—Numa Pompilius, 2d King of Rome (715-672 B. C.), corrected the calendar by adding two months, making 12.

753 B. C.—The Roman calendar dates from the founding of Rome.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 7.

SIR WILLIAM HUGGINS.

*b. February 7, 1824.*

*d.*

English astronomer. Distinguished for his observations and discoveries made with the spectroscope on the sun and stars. By the spectra of various comets he found that the greater part of the light of these objects is different from solar light. He observed the spectra of the solar prominences and devised the method by which the forms of these objects may be seen. In 1875 he was engaged in obtaining photographs of the ultra-violet portions (invisible to the eye observation) of the spectra of stars. In 1900 he published "Representative Stellar Spectra."

*The morning stars,  
When first they sang o'er young creation's birth,  
Heard thy deep anthem; and those wrecking fires  
That wait the archangel's signal to dissolve  
The solid earth, shall find Jehovah's name  
Graven, as with a thousand diamond spears,  
On thine unfathomed page.*

—Niagara : MRS. SIGOURNEY.

*Roll on, ye Stars! Exult in youthful prime,  
Mark with bright curves the primless steps of Time;  
Near and more near your beamy cars approach,  
And lessening orbs on lessening orbs encroach;  
Flowers of the sky! Ye too to age must yield,  
Star after star from Heaven's high arch shall rush,  
Suns sink on suns, and systems systems crush,  
Headlong, extinct to one dark centre fall,  
And Death, and Night, and Chaos mingle all!*

—Botanic Garden : DR. DARWIN.

DMITRI IVANOVICH MENDELIEFF.

*b. February 7, 1834.*

*d.*

Russian chemist. He was familiar with every branch of chemical science. He studied the chemical properties of petroleum in the mines of Caucasia and Pennsylvania. His law of chemical combination made him famous. This law has led to the discovery of numerous chemical elements including gallium, scandium and germanium. His "Principles of Chemistry" was published in Russian in 1868-'70, and translated into English in 1892.

*In the darksome depth of the fathomless mine  
My tireless arm doth play,  
Where the rocks ne'er saw the sun's decline,  
Or the dawn of the glorious day;  
I bring earth's glistening jewels up  
From the bloated cave below,  
And I make the fountain's granite cup  
With a crystal gush o'erflow.*

*Yes, while on earth a thousand discords ring,  
Man's senseless uproar mingling with his toil,  
Still do they, quiet ministers, move on,  
Their glorious tasks in silence perfecting!  
Still working, blanning still our vain turmoil,  
Labourers that shall not fail, when man is gone.*

—Quiet work : MATTHEW ARNOLD.

1701.—Boerhaave founded organic chemistry.

1799.—Gas was first evolved from coal.

1904.

SUNDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 8.

JOHN BOGART.

b. *February 8, 1836.*

d.

Rutgers College, 1853.

American engineer. He was Chief Engineer of the Brooklyn Park Commission in the construction of Prospect Park, and Chief Engineer of the Department of Public Parks of New York City, from 1872-'77; Deputy State Engineer and Surveyor in 1886 and '87; elected State Engineer and Surveyor in 1887. He was Consulting Engineer for the (Niagara) Cataract Construction Company.

*Down, down forever—down, down forever,*

*Something falling, falling, falling,*

*Up, up forever—up, up forever,*

*Resting never.*

*Boiling up forever,*

*Steam-clouds shot up with thunder-bursts appalling.*

*Foam-clouds there forever rise*

*With a restles roar o'erboiling—*

*Rainbows stooping from the skies*

*Charm the eyes,*

*Beautiful they rise,*

*Cheering the cataracts to their mighty toiling*

*A Vision's Spell—Niagara; ANONYMOUS.*

1446.—Earthenware pipes used for conducting water to the Capitol from Chapultepec, Mexico.

1776.—First reservoir in America was built in New York.

1776.—Hydrant water introduced in New York through wooden pipes, or pump-logs.

FRIEDLIEB FERDINAND RUNGE.

b. *February 8, 1795.*

d. *March 25, 1867.*

German chemist. In 1834 he proved that aniline was a constituent of coal-tar. He discovered rosolic acid in 1834 in coal-tar; also discovered leucoline or quinoline in 1834, and later pyrrrol. In 1834 he first noticed that aniline when brought in contact with chloride of lime gave brilliant colors.

*While they cheer the eye*

*With glowing purple of the Tyrian dye;*

*Or, justly intermixing shades with light,*

*Their colourings insensibly unite.*

*As when a show'r transpierced with sunny rays,*

*Its mighty arch along the heav'n displays;*

*From whence a thousand different colours rise,*

*Whose fine transition cheats the clearest eyes.*

—*Pallas and Arachne*: OVID'S METAMORPHOSES.

*Soft cobweb clouds transparent Onyx spreads,*

*And playful Agates weave their color'd threads;*

*Gay pictured Mochoes glow with landscape-eyes,*

*And changeful Opals roll their lucid eyes;*

*Blue lambent light around the Sapphire plays,*

*Bright Rubies blush, and living Diamonds blaze.*

*Botanic Garden: DR. DARWIN.*

2400 B. C.—Indigo-dyeing was known.

1803.—London. The atomic theory was announced by John Dalton in a lecture. 1808 he published his views in his New System of Chemical Philosophy.

1840.—Anilin was invented by Hoffmann and Fritzsche.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 9.

DANIEL BERNOULLI.

b. *February 9, 1700.* d. *March 17, 1782.*

Swiss mathematician and physicist. He, with his father, Jean, laid the foundation of modern determine hydraulics, by establishing the equation,  $v = 1/\sqrt{2gh}$ . He was the first to propose the propulsion of ships by the reaction of a stream of water thrown backward, a suggestion which differs in detail only from the paddle and the screw.

*Matter is a condensation of mind into visible shape as water is of moissible gases.*

—R. L. DAWSON.

*But the stalwart miller with mealy face  
Works, whistling, in his hiding place,  
And he only thinks as he hears the wheel*

*"What a famous river for grinding meal!"*

*The poet when rains have ceased to flow  
Sings to the seven-colored bow;*

*The miller, his sense of beauty shut*

*Calmly gauges the water-butt.*

—R. C. F. HANNAY.

1654-1705.—Jacques Bernoulli, a distinguished mathematician, lived.

1697-1748.—Jean Bernoulli lived.

1703.—Jacques Bernoulli presented the final and complete results of his investigations of the center of oscillation, correcting errors made and published by him in 1686.

1717.—Jean Bernoulli communicated to Varignon the universal applicability of the principle of virtual displacements.

SAMUEL JOHNSTON.

b. *February 9, 1835.* d.

American inventor of agricultural implements, including a corn-and bean-planter and a bean-harvester. In 1856 he applied his first self-rake to the Ketchum reaper, and in 1887 he completed a new self-rake binder.

*They are riding in Aroostook on a patent sulky plow,*

*—They are riding, taking comfort, for they've learned the secret how.*

*They are planting their potatoes with a whirling new machine,*

*—Driver sits beneath an awning; stickest thing you've ever seen.*

*Gee and Bright go lurching onward in the furrow's mellow stream.*

*Over there, with clank of whistle, tugs a sturdy Morgan team.*

*And the man who rides the planter or who plods the broken earth*

*Joins and swells the mighty chorus of the season's budding mirth.*

*And they've pitched the tune to a jubilant strain,*

*They are tilting it merrily now,*

*We waited for that melody up here in Maine,*

*—'Tis the song of the harrow and plow.*

—*The Song of the Harrow and Plow; Days up in Maine.*

1839.—Driver's seat and lever control were applied to cultivators.

1853.—Silla and Adams built reaping machines with driver's seats and rake attachments.

1857.—Charles and William Marsh invented a grain cutting machine which delivered the grain ready to be bound to the men riding upon the machine.



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MEMORANDA AND DIARY.

## FEBRUARY 10.

IRA REMSEN.

*b. February 10, 1846.*

*d.*  
College of Physicians and Surgeons, 1867.

American chemist who has carried on systematic, scientific research. Among these are studies on "The Oxidation of Substitution-Products of Aromatic Hydrocarbons;" researches "On the Relations between Oxygen, Ozone, and Active Oxygen;" an investigation "On Chemical Action in a Magnetic Field," in which positive evidence is furnished for the first time that chemical action is influenced by magnetism; studies "On the Sulphinides," a new class of organic compounds. One discovery in his laboratory has come into prominence under the name of *saccharine*, a product derived from coal tar in 1887. It is three hundred times sweeter than cane sugar.

*Our Science grasps with its transforming hand ;  
Makes real, half the tales of wonder-land.  
We turn the deathliest fetor to perfume ;  
We give decay new life and rosy bloom ;  
Change filthy rags to paper virgin white ;  
Make pure in spirit what was foul to sight,  
Even dead, receding force, to a fairy gift  
Of help as turned, and taught to defy lift.  
How can we think God hath no crucible  
Save that Black Country of a burning Hell ?  
Or the great ocean of Almighty power,  
No scope to take the life-stream from our shore,  
Muddy and dark, and make it pure once more ?  
—A Tale of Eternity : GERALD MASSEY.*

SIR DAVID BREWSTER.

*b. December 11, 1781.*

*d. February 10, 1868.*

Scottish physicist; inventor of the kaleidoscope, 1816. His investigations into the phenomena of polarized light will perpetuate his name. He shared also with Fresnel the merit of elaborating the dioptric system for the improvement of our lighthouse; and he divided with Wheatstone the merit of introducing the stereoscope, the lenticular instrument belonging especially to Brewster. In telescopes, he suggested advantages that might accrue from the use of gems having high refractive and low dispersive indices.

*Labor, fusing opaque articles of rock, produced transparent glass, which it moulds, and polishes, and combines so wonderfully that sight is restored to the blind ; while worlds before invisible from distance are brought so near as to be weighed and measured with an unerring exactness, and atoms which had escaped all detection from minuteness reveal a world of wonder and beauty in themselves.*

—Labor : REV. NEWMAN HALL.

*Cling round the aerial bow with prisms bright,  
And, pleased, unwind the sevenfold threads of light.*

—Botanic Garden : DR. DARWIN.

4th Century, B. C.—The spherical shape of the earth was taught by the Greeks.

1367.—The *Opus Major* by Roger Bacon appeared, teaching the sphericity of the globe.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 11.

THOMAS ALVA EDISON.

*b. February 11, 1847.*

*d.*

American electrician and inventor. He invented an automatic repeater, by which a message could be transferred from one wire to another without the aid of an operator. In 1864 he conceived the idea of sending two messages at once over the same wire, which led to experiments in duplex telegraphy which succeeded in 1872, and has since developed into quadruplex and sextuplex transmission. In 1868 he utilized one submarine cable for two circuits. He invented the printing telegraph for stock quotations; the carbon telephone transmitter; the aerophone; the megaphone; the phonograph; the musical phonograph; the kinetograph; the phonometer, an apparatus for measuring the force of sound waves produced by the human voice. He solved the problem of electric lighting, and in December, 1879, gave a public exhibition of a complete system of electric lighting. He invented the tasimeter, which measures degrees of heat, moisture, odors, sound, etc., so small and slight that human mind could not comprehend them. He applied the principle of magnetism to cleaning wheat from the iron and steel particles contained.

*Think! and let the thought not nerve you—  
Think of men who've gone before;*

WILLIAM KELLY.

*b. August 22, 1811.*

*d. February 11, 1888.*

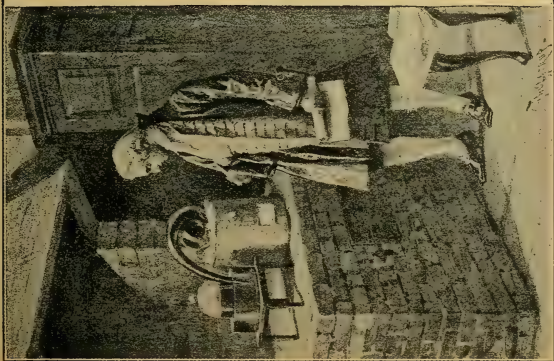
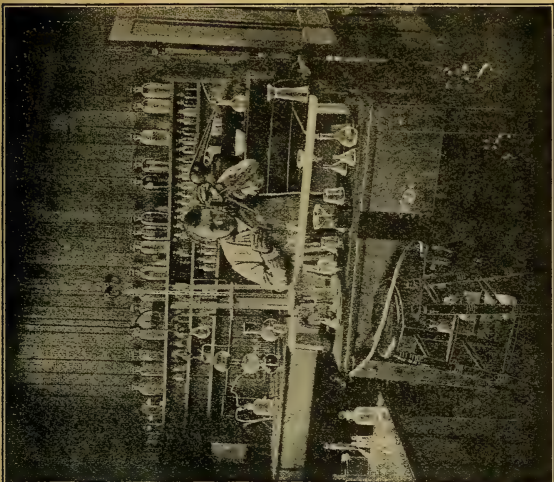
American inventor and manufacturer. At the age of eighteen he built a propelling water-wheel, and four years later a revolving steam engine; in 1847 he experimented in decarbonizing iron by introducing a current of air, and making pig-iron into steel by means of a converter. He found that no fuel was required if powerful blasts of air were forced into the fluid metal. This is the basic principle of the Bessemer process. It was known as "Kelley's air-boiling process." The process was used for the manufacture of boiler plates before Sir Henry Bessemer was known, and Kelly was the inventor.

*Iron is not only the soul of every other manufacture, but the main-spring of civilized society.*

—FRANCIS HORNER.

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*Leaving lustrous names to serve you;  
Yours the path they've plodded o'er!  
Freedom fights and wins her charter,  
Tyrants now can find no quarter  
In the ranks of thinking men.  
Think! for thought's a wand of power—  
Power to make oppression shrink;  
Grasp ye, then the precious dower!  
Poise it—wield it—work and think!*





1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 12.

JAMES DWIGHT DANA.

b. *February* 12, 1813.

d.

American geologist and mineralogist. Besides mineralogy and geology, he devoted his attention to zoology, including the crustaceans and corals. The results of his labors were given in his "Reports on Zoophytes" (1846), in which he proposed a new classification. He has published "System of Mineralogy" (1837 and 1868); "Coral Reefs and Islands" (1853); "Manual of Geology" (1863); "Corals and Coral Islands" (1853).

*'Tis a life-long toil till our lump be leaven;  
The better! What's come to perfection perishes;  
Things learned on earth we shall practise in heaven;  
Works done least rapidly, Art most cherishes.*

—R. BROWNING.

*Hence in fine streams diffusive Acids flow,  
Or wing'd with fire o'er Earth's fair bosom blow;  
Transmute to glittering Franks her chalky lands,  
Or sink in Ocean's bed in countless sands.  
Hence silvery Selenite her crystal moulds,  
And soft Asbestos smooths his silky folds;  
His cubic forms phosphoric Fluor prints,  
Or rays in spheres his amethystine tints.*

—*Bolanic Garden*: DR. DARWIN.

1837.—Phosphate rock was discovered in South Carolina.

1785.—James Hutton founded the new geology. He expounded on granite veins in Edinburgh in 1788, and his theory of the earth was published.

PETER COOPER.

b. *February* 12, 1791.

d. *April* 4, 1883.

American philanthropist. He was successively a hatter, a carriage-maker, a machinist and a manufacturer. He constructed a machine for mortising the hubs of carriages, and machines for shearing cloth. In 1830, from his own designs, he built the first locomotive constructed on this continent. In 1845 he built three blast-furnaces in Phillipsburg, Pa., which were the largest then known. The success of the Atlantic cable was largely due to his persistent efforts. From plans of his own making, the "Cooper Union for the Advance of Science and Art" was erected.

*Strike! Time improving ever,  
For as sparks the minutes fly;  
Miss the moment never.  
Watch your opportunity.*

*Strike! Obstacles subduing,  
Harder far than iron bar.  
All that's worth pursuing  
Follow still with iron will,  
And strike; tarry not, but strike.*

—*The Anvil*: HICKSON.

1804.—The first locomotive was used on the Merthyr Tydvil road in Wales.

1404.—Hats were first made by a Swiss at Paris.

1860.—Cooper Institute was opened.

1849.—Abraham Lincoln secured letters patent on boat for lifting vessels over shoals.



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1904.

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MEMORANDA AND DIARY.

## FEBRUARY 13.

RUGGIERO GIUSEPPE BOSCOVICH.

b. May 18, 1711.

d. February 13, 1787.

Italian physicist and astronomer. He was among the first savants of continental Europe to adopt the Newtonian philosophy, which he explained in "Philosophiæ Naturalia Theoria" (1758). About 1750 he was employed by the Pope to measure an arc of the meridian.

*Stars, whose beams have never reached our world,  
Through science meets them midway in the heaven  
With prying optics, weighs them in her scale,  
Measures their orbs, and calculates their courses;  
Some barely visible, some proudly shine,  
Like living jewels.*

*Men of a thousand shifts and wiles, look here!  
See one straightforward conscience put in pawn  
To win a world; see the obedient sphere  
By bravery's simple gravitation drawn!*

220 B. C.—Eratosthenes made the first attempt to measure the circumference of the earth.

100-170 A. D.—Ptolemy discoursed on geography. He founded the Ptolemaic system of astronomy, and discovered the place and distances of the planets.

130.—Ptolemy devised the circles and epicycles that distinguished his system.

1253.—The Alphonsine astronomical tables were composed in Spain.

1543.—Copernicus' system was published.

PIERRE LOUIS GUINAND.

b. about 1748.

d. February 13, 1824.

Swiss optician. He improved greatly the glass used for telescopes, and after many years of patient labor succeeded in producing pure discs of flint glass as large as six inches in diameter. The modern refracting telescope thus became possible.

*The Telescope, that sweeps the sky,  
And brings the pilgrim planet nigh,  
Familiar as the Sun's pale Bride;—  
The microscopic Lens.*

—ANONYMOUS.

*The proudest motto for the young,  
Write it in lines of gold  
Upon thy heart, and in thy mind  
The stirring words enfold,  
And in misfortune's dreary hour,  
Or fortune's prosperous gale,  
'Twill have a holy, cheering power—  
There's no such word as fail.*

—There's No Such Word as Fail.

328 B. C.—Praxiteles made silver mirrors.

1608.—The first telescope was used in England.

1731, May.—Philadelphia. Thomas Godfrey obtained a patent for his reflecting quadrant, used in taking altitudes of sun or stars.

1731.—A reflecting sextant was made by John Hadley.

1753.—Bouguer invented the heliometer for measuring small angles.

1904.

SATURDAY.

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MEMORANDA AND DIARY.

## FEBRUARY 14.

GEORGE GEDDES.

*b. February 14, 1809.*

American engineer and lawyer. He had charge of the lowering of the Oswego Canal, through the Seneca River, in 1853-1856; from 1865-1871 he was Superintendent of Onondaga salt springs.

*When a person knows so much  
More than common folks and such,  
Of all that's useful, wise and good,  
How heathen first carved stone and wood,  
When Tubal Cain first forged iron,  
Who made the armor of King Priam,  
The alchemic secrets can reveal,  
Tell how to make the strongest steel,  
How swords are made by Moslem Turk,  
The Swiss lake-dwellers' handiwork,  
Whence King Solomon mined his gold,  
How Hansa merchants bought and sold  
The wondrous medieval lore,  
How ancients mined and melted ore,  
Who first made each Yankee notion,  
From ideas born across th' ocean,  
The names of all the patents,  
Inventions first made by Chinese,  
And by figures clear and fair  
Can surely make the circle square,  
And in the plainest kind of speech,  
Prove *2gh*;  
And can discourse on these at length,  
With memory of such brutal strength  
As fits a cyclopaedia.  
In fancy free, I'd speedier  
Remain a maid to end of time*

JOHN PERRY.

*b. February 14, 1850.*

*d.*

English engineer. He and W. E. Burton were joint engineers to the Faure Accumulator Company. Their inventions are: a dynamo machine, in which the system of multipolar winding is first employed (1882); permanent magnet and spring ammeters and voltmeters, with and without commutators; solenoid and shielded ammeters and voltmeters; spring balances; resistances for use with strong currents varied by foot and hand; ergmeters; power meter; olunmeter; non-sparking key; electro-motors; switches for use with accumulators; arrangements for lighting railway trains; photometers; secohmeters; dynamometer couplings, and transmission and absorption dynamometers; an electric arc lamp; a governor for motors and dynamos; an electric tricycle; an electric railway system with friction gearing; contact boxes and locomotives, forming part of the general system belonging to the Telpherage Company (Limited).

1812-1902.—Abraham Fisher, the father of the valentine in America, lived.

*Then have him for my valentine.*

—*An Engineer's Valentine*; A. M. B.

1654, August 16.—New York. The Onondaga salt springs were discovered by the Jesuits.

1904.

SUNDAY.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 15.

SIR WILLIAM HENRY PREECE.

b. February 15, 1834.

d.

King's College, London.

English engineer. He was known by his researches in electricity, his inventions and as a speaker and lecturer. He patented many inventions, including a new method of duplex telegraphy (1855); a new mode of "terminating" wires (1858); electric signalling between different parts of a moving train (1861); electric signals for railways (1862); a domestic electric telegraph (1864); interlocking electric railway signals (1865); and a new telephone (1878). He introduced both the telephone and the phonograph into England.

*Think the thought, and speak the word,  
It is caught as soon as heard,  
Borne o'er mountains, lakes and seas,  
To the far antipodes;  
Boston speaks at twelve o'clock,  
Natchez reads ere noon the shock.  
Seems it not a feat sublime?  
Intellect has conquered Time!  
Sing who will of Orphean lyre,  
Ours the wonder-working wire!*

—The Electric Telegraph: ANONYMOUS.

1845.—The first telegraph line over which newspaper despatches were sent between New York and Philadelphia was commenced.

1846, September 9.—Telegraph between New York and Albany.

CYRUS HALL MCCORMICK.

b. February 15, 1809.

d. May 13, 1884.

American inventor and manufacturer of agricultural machinery, especially the first practical, self-binding reaper in 1834. His machine was adapted originally to be pushed like Bell's. It had no seat or stand provided for the raker, who had to walk behind the machine and haul the gavels therefrom. A brother of Cyrus, Leander James, gives the credit of most that has been claimed by Cyrus to the father, Robert.

*What delights us more  
Than studiously to trace the vast effects  
Of unabated labor? To observe  
How soon the golden field abounds with sheaves?  
How soon the oat and bearded barley fall,  
In frequent lines before the keen-edged scythe?  
The clatt'ring team then comes, the swarthy hind  
Down leaps and doffs his frock alert, and plies  
The shining fork. Down to the stubble's edge  
The easy wain descends half built, then turns  
And labors up again. From pile to pile  
With rustling step the swain proceeds, and still  
Bears to the groaning load the well-poised sheaf.  
The gleaner follows, and with studious eye  
And bended shoulders traverses the field  
To cull the scattered ear, the perquisite  
By heaven's decree assigned to them who need,  
And neither sow nor reap.*

—HURDIS.

1855.—A successful reaper was exhibited at Paris.

1904.

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MEMORANDA AND DIARY.

## FEBRUARY 16.

THOMAS ANDREWS.

*b. February 16, 1847.*

*d.*

Scottish chemist and civil engineer. He determined the relative corrosibility of wrought iron and modern steels in sea-water; the resistance of metals to sudden concussion at varying temperatures; the influence of climatic temperature changes on the strength of railway material. In 1863 he first showed that there was a continuity in the liquid and gaseous states of matter, and that each substance had a critical temperature at which it became a homogeneous fluid, neither a liquid nor a gas. He made researches on electro-chemical effects on magnetizing iron, which have shown that magnetic iron or steel is electro-positive to unmagnetized iron in certain chemical solutions. He discovered that the passive state of iron was influenced by magnetism. He patented hydraulic machinery used in connection with the manufacture of iron.

*Lo! the world is rich in blessings—  
Earth and Ocean, Flame and Wind,  
Have unnumber'd secrets still,  
To be ransack'd when you will,  
For the service of mankind;  
Science is a child as yet,  
And her power and scope shall grow,  
And her triumphs in the future  
Shall diminish toil and woe;*

GIORDANO BRUNO.

*b. about 1550.*

*d. February 16, 1600.*

Italian philosopher. He was a monk who escaped from the convent and was arrested by the Inquisition. His theory of the world was pantheistic. In his work, "Del Infinito Universo," he asserts the infinity of the universe and the plurality of worlds; that the stars are suns shining by their own light, that each has its revolving planets. He was well versed in astronomy and adopted the views of Copernicus; he believed in astrology.

*Yet though so skilt'd of such transcendent worth,  
This boarded scaffold doth he not despise;  
The fate that on its axis turns the earth  
From day to night, here shows he to our eyes,  
Raising, through many a work of glorious birth,  
Art and the artist's fame up tow'rd the skies.  
He fills with blossoms of the noblest strife,  
With life itself, this effigy of life.  
— Epilogue to Schiller's "Song of the Bell": GOETHE.*

399 B. C.—Athenes. Socrates was accused of impiety and of corrupting the Athenian youths, and was condemned to death. He drank a cup of hemlock and died in the midst of his disciples.

*Shall extend the bounds of pleasure  
With an ever-widening ken,  
And of woods and wildernesses  
Make the homes of happy men.  
—The Three Preachers: CHARLES MACKAY.*



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MEMORANDA AND DIARY.

## FEBRUARY 17.

HORACE BENEDICT DE SAUSSURE.

*b. February 17, 1740* *d. January 23, 1799.*

Swiss naturalist and inventor. He was the inventor of instruments called the cyanometer and the diaphanometer, for ascertaining the transparency of the air at different heights, and also made improvements in the thermometer and hygrometer.

*Were there no atmosphere, the evening sun would in a moment set, and, without warning, plunge the earth in darkness. \* \* \* In the morning, gairish sun would at once burst from the bosom of night, and blaze above the horizon, but the air watches for his coming, and sends at first one little ray to announce his approach, and draws aside the curtain of night, and slowly lets the night fall on the face of the sleeping earth, till her eye-lids open, and, like man, she "goeth forth again to her labor till the evening."*

—*The Atmosphere.*

1643.—Atmosphere pressure was discovered and demonstrated by Torricelli.

1680.—Robert Boyle published the results of his experiments *in vacuo*, and the effect of compressing and rarefying air on temperatures.

1830.—Psychrometer, an apparatus for measuring the amount of elastic vapor in the atmosphere, was invented by Joseph Louis Gay-Lussac.

1848.—It was modified by Regnault.

URIAH ATHERTON BOYDEN.

*b. February 17, 1804.* *d. October 17, 1879.*

American inventor and engineer; made improvements in turbines.

*Far, far away that river's place of birth  
'Mid weeds and waving flowers, its native earth;  
Onward it came, and gathering us it passed,  
Grew from a fountain to a stream at last;  
Until, to strength increased, to manhood grown,  
It turned the upper and the nether stone!  
A duteous course the faithful water ran,  
The vassal of the mighty master, man.  
Their aim achieved—their toilsome duty done,  
Thenceforward, on the rushing waters run,  
And, at the last, with patient lapse they glide  
To ocean's shore and mingle with the tide.  
Be this, my soul, a parable to thee,  
Thus make thy courses, and so meet the sea!*  
—*Duty Done.*

400 B. C.—Archytas of Tarentum invented hydraulic machines.

539.—Floating mills were erected on the Tiber, Rome.

555.—Belisarius (?) invented water-mills for grinding corn.

1827.—A turbine was invented by Benoit Fourneyron, but M. Burdin was the first to construct turbine water-wheels.

1894, Jan. 25.—The turbine wheels of the great Niagara tunnel were started.

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MEMORANDA AND DIARY.

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## FEBRUARY 18.

FRANCESCO REDÌ.

- b. *February* 18, 1626. *d. March* 1, 1695.  
Italian naturalist and poet. He belonged to the school of Galileo and is ranked as one of the greatest observers of the age. He wrote "Experiments on the Generation of Insects" (1668).

*Nature is an enormous system, but in mass and in particle curiously available to the humblest need of the little creature that walks on the earth!*  
—*Progress of Culture*; EMERSON.

*Tired! Well, what of that?  
Didst fancy life was spent on beds of ease,  
Fluttering the rose leaves scattered by the breeze?  
Come, rouse thee! work while it is called to-day!  
Coward, arise! go forth upon the way!*

*Hard! Well, what of that?  
Didst fancy life one summer holiday,  
With lessons none to learn, and naught but play?  
Go, get thee to thy task! Conquer or die!  
It must be learned! Learn it, then, patiently!*

1853.—A disease broke out among the silk worms which reduced the value of silk crop to about one-third.

1858.—A commission of inquiry was appointed.

1863.—The grape-vine disease was much abated.

1865.—New grape-vine malady caused by the phylloxera vastatrix was observed in France.

1894, Aug. 25.—Grasshoppers devoured and destroyed the grass in Cheyenne, Wyo.

1894, Aug. 26.—Boll-worms destroyed a large portion of the cotton crop in Dallas, Tex.

GALILEO.

- b. *February* 18, 1564 *d. January* 8, 1642.  
Italian astronomer. Discovered the regularity of the oscillation in the pendulum, and invented the telescope in 1609. Discovered the satellites of Jupiter, January 7, 1610. He is supposed to have been the first to experiment on the laws of falling bodies, and discovered and established the law of universal gravitation. He invented the thermometer about 1603. He was imprisoned at Arcetri, near Florence, toward the close of his life, by order of the Inquisition.

*And thou, illustrious sage! thine eye is closed,  
To which their secret paths new stars exposed.  
Haply thy spirit, in some higher sphere,  
Soars with the motions which it measured here.*

*Soft be thy slumbers, Seer, for thanks to thee,  
The earth now turns without a heresy.*

*Dost thou, whose keen perception pierced the cause  
Which gives the pendulum its mystic laws,  
Now trace each orb, with telescopic eyes,  
And solve the eternal clock-work of the skies,*

*While thy worn frame enjoys its long repose,  
And Santa Croce heals Arcetri's woes?*

1564-1642.—Galileo was the founder of dynamics; prior to his investigations scientists had given their attention to statics.

1608-1647.—Torricelli lived. He was Galileo's amanuensis.

1610.—Galileo noted the sun's spots.

1633.—Galileo's doctrines were condemned at Rome.

1637.—Galileo discovered the librations of the moon.

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MEMORANDA AND DIARY.

## FEBRUARY 19.

JOHN LOCKE.

*b. February 19, 1792.*

*d. July 10, 1856.*

Yale, 1819.

American physicist; one of the pioneers in botany, geology and electricity, making many discoveries in these branches, especially in terrestrial magnetism. He made various improved and original instruments for use in optics, physics, electricity and magnetism, among which were the gravity escapement for regulator-clocks (1844), which has never been surpassed; an electro-chronograph (1848); the plantascope and a spirit-level (1850).

*I'm the worker! Night and day,  
Without food or drink or pay;  
Thro' the sunshine and the storm,  
Winter cold, and summer warm,  
At the midnight's stillest time,  
And the morning's earliest chime,  
My hands are ever busy found—  
Days and years—a ceaseless round—  
While you lie dreaming on your back,  
Tick-a-tack! Tick-a tack!  
Self-loving bee, in me you see  
A striking type of industry!*

—The Bee, Clock and Broom: MACAULAY.

*At best Man doth but darkly draw his light;  
Each step ye take, each secret wrest from Night,  
Must furnish food for faith as well as sight.*

—A Tale of Eternity: GERALD MASSEY.

SIR WILLIAM FAIRBAIRN.

*b. February 19, 1789.*

*d. August 18, 1874.*

British engineer. He made important improvements in mill-machinery, in the circular half-lap couplings and the highspeed pulleys on shafting. He was mainly instrumental in the substitution of iron for wood. He effected great improvements in water-wheels made entirely of iron, and was among the first to build iron ships. He was associated with Robert Stephenson in the planning and erection of the Britannia and Conway tubular bridges, and with Mr. Tate in determining the density of steam at various pressures and temperatures.

*Here the grim Cyclops ply, in vaults profound,  
The huge Æolian, forge that thunders round,  
Th' eternal anvils ring the dungeon o'er;  
From side to side the fiery caverns roar.  
Loud groans the mass beneath their ponderous blows,  
Fierce burns the flame, and the full furnace glows,  
The alternate blows the brawny brethren deal;  
Thick burst the sparkles from the tortured steel,  
Huge strokes rough Steropes and Brontes gave,  
And strong Pyracmon shook the gloomy cave. —PITT.*

*The meadow brook, that seemeth to stand still,  
Quickens its current as it nears the mill;  
And so the stream of Time that lingereth  
In level places, and so dull appears,  
Runs with a swifter current as it nears  
The gloomy mills of Death.*

—LONGFELLOW.

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MEMORANDA AND DIARY.

## FEBRUARY 20.

MATTHEW MURRAY.

b. 1765. *d. February 20, 1826.*

Scotch blacksmith and inventor. The invention of the planing-machine is claimed for him. He made many improvements in machinery for spinning flax; added to the steam engine an automatic apparatus to regulate the generation of steam in the boiler; improved the D-slide-valve, and added to the power of the air-pump; and invented a heckling machine and a machine for wet flax-spinning.

*Art's glorious things that give the Mind  
Dominion over Time and Space—  
The silken Car, that rides the wind;  
The Steel, that trackless seas can trace;  
The Engine, breathing fire and smoke,  
That Neptune's potent sway had broke,  
And sculls its skips 'gainst wind and tide.*

*Winged by the lever, the stone from the rocky crevice is loosened;  
Into the mountain's abysses boldly the miner descends.  
Mute'siber's anvil resounds with the measured stroke of the hammer;*

*Under the fist's nervous blow, spurt out the sparks of the steel.  
Brilliantly twines the golden flax round the swift whirling  
spindles,  
Through the strings of the yarn whizzes the shuttle away.*

—*The Walk*; SCHILLER.

1803.—The first cotton mill in New Hampshire was opened.

TOBIAS MAYER.

b. February 17, 1723. *d. February 20, 1792.*

Self-taught German astronomer. He wrote "Theory of the Moon"; "Astronomical Tables and Precepts"; "A New and General Method of Resolving Geometrical Problems"; "A New Mathematical Atlas"; and "Account of a Lunar Globe."

*The skill that pervades complex details; the man  
that maintains himself; the chimney taught to  
burn its own smoke; the farm made to produce all  
that is consumed on it; the very prison compelled  
to maintain itself and yield a revenue, and, better  
still, made a reform school, and a manufactory of  
honest men out of rogues, as the steamer made fresh  
water out of salt—all these are examples of that  
tendency to combine antagonisms, and utilize evil,  
which is the index of high civilization.*

—MAYER.

*The more ye feel the chain whereby ye are spanned,  
The more its missing links elude the hand,  
So Saturn's perfect rings, when, closer seen,  
Are broken with dark gaps of night between;  
Nor can ye more than mark the Visible shine  
And in the gloom accept the Hand Divine.*

—*A Tale of Eternity*; GERALD MASSEY.

1571-1601.—Tycho Brahe, having built an observatory, made important astronomical discoveries.

1577.—He demonstrated that comets are extraneous to our atmosphere.



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MEMORANDA AND DIARY.

SIR FRANCIS RONALDS.

b. February 21, 1788.

d. August 8, 1873.

English inventor of a telegraph system that transmits signals with the use of only a single circuit. In 1845 he devised a system of continuous automatic registration for meteorological instruments by means of photography, and applied it to the atmospheric electrometer, the thermometer, barometer, declination magnet, and horizontal and vertical force magnetographs.

*Thought outflies the light of morning ;*

*Not on fancy's aimless ear,*

*But in real earnest language*

*Sends intelligence afar ;*

*Seated bold in lightning chariot,*

*Thought delighted flies away,*

*Earth's broad journey seems a plaything—*

*Thought no longer brooks delay ;*

*It forsakes accustomed channels—*

*Draws more distant empires near ;*

*Thought is now but just awaking ;*

*Who can tell its grand career ?*

—*Thought and the Telegraph* : G. A. HAMILTON.

1684.—The first idea of the modern telegraph was suggested by Dr. Robert Hooke.

1816.—Ronalds succeeded in making a perfect apparatus for transmitting signals by electricity.

1841.—Wheatstone's alphabetical printing telegraph was patented.

1844.—Telegraph wires laid in America between Washington and Baltimore.

ABBE SALVATORE DEL NEGRO.

b.

d.

Italian priest and professor. In 1830 he made the first electric motor, which was a mere toy, but nevertheless the prototype of the machinery of the modern electric railway.

*Man has his will—but woman has her way !  
While man's dull spirit toils in smoke and fire,  
Woman's swift instinct threads the electric wire—  
The magic bracelet stretched beneath the waves  
Beats the black giant with his score of slaves.*  
—*Prologue*.

*Crafty men condemn studies, simple men admire  
them, and wise men use them ; for studies teach  
not their own use—this wise men learn by observa-  
tion. Read not to contradict and refute, not to be-  
lieve and take for granted, but to weigh and  
consider.*

—BACON.

1600.—Gilbert made experiments in electricity. He published his work on the magnet and magnetic bodies.

1785.—An electric machine was constructed at Haarlem, by Van Marum (Dutch).

1818.—Prof. Oersted discovered the magnetic property of an electric current.

1820.—Dominique F. Argo magnetized a needle by the electric current, and attracted iron filings by the connecting wire of a galvanic battery.

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MEMORANDA AND DIARY.

## FEBRUARY 22.

HEINRICH HERTZ.

b. February 22, 1857. d. January 1, 1894.

German philosopher, electrician and civil engineer. He made many important researches and discoveries in electricity; and wireless telegraphy of to-day is the direct outcome of his experiments on electric waves. He investigated a new branch of experimental physics, that of the action of light on electricity. In the last three years of his life he completed a work on "The Principles of Mechanics."

*The very process of acquiring knowledge is a privilege and a blessing. It used to be said that there was no royal road to learning; it would be more true to say that the avenues leading to it are all royal.*

—SIR J. LUBBOCK.

*Dear, dear Simplicity! they little thought  
To what perfection science could be brought;  
And should they wake in this steam-lightning age,  
What breathless wonder would their powers engage;  
Ah, much I fear, their strong good sense would fail them,  
They'd drive us all in judgment down to Salem.*

—The Old Garret; ABNEY ALLIN.

1789. —Luigi Galvani experimented with electricity at Bologna (galvanism). From the twitching of a frog's legs he conceived the galvanic battery.

1791. —Galvani's and Volta's scientific researches were made public.

1805. —Behrens invented his dry voltaic pile.

PETER ANICH.

b. February 22, 1723. d. September 1, 1766.

Tyrolean geometer and astronomer; one of the first mechanics in Europe. He constructed globes and mathematical instruments, and at length undertook a general survey of the Tyrol. He was the son of a peasant.

*A pair of compasses, belonging to a geographer, was lying on a table, when a goat, happening to pass by, addressed to it the following taunt: "Your limbs serve but to straddle across a piece of paper; mine to bound over the mountains."*

*"Your limbs," replied the instrument, "enable one wretched animal to seek its food; mine assist a sage to map the world."*

*Moral—Science, though despised by the ignorant, is better than bodily strength.*

—The Goat and Compasses.

WILLIAM J. MACQUORN RANKINE.

*Pleasure is a shadow; wealth is vanity, and power a pagant; but Knowledge is ecstatic in enjoyment, perennial in fame, unlimited in space, and infinite in duration. In the performance of its sacred office it fears no danger, spurs no expense, omits no exertion. It scales the mountain, looks into the volcano, dives into the ocean, perforates the earth, enriches the globe, explores sea and land, contemplates the distant, ascends to sublimity; no heavens too exalted for its reach.*

—DR WITT CLINTON.

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MEMORANDA AND DIARY.

## FEBRUARY 23.

FRANKLIN LEONARD POPE.

*b. December 2, 1814. d. February 23, 1895.*

American electrician and mechanic. He was the originator and constructor of the earliest successful type-printing telegraph, first invented in 1844 and perfected in 1848; it printed communications in Roman characters at fifty words per minute, by the action of compressed air controlled by electricity. With Edison he invented in 1870 the one-wire telegraph machine known as the "ticker," and in 1872 he invented the rail circuit for automatically controlling block signalling.

*His daring foot is on land and sea everywhere, he colonizes the Pacific, the archipelagoes,  
With the steamship, the electric telegraph, the newspaper, the wholesale engines of war,  
With these and the world-spreading factories he interlinks all geography, all lands;  
What whisperers are these, O lands, running ahead of you, passing under the seas?*

—Years of the Modern: WALT WHITMAN.

*They may not pause when the sun is high,  
Nor rest when the light is low;  
For while men live, and act, and die,  
The word flies to and fro.  
It leaps the sea, it spans the plain;  
On throbbing wire and mighty chain,  
It runs like fire from main to main,  
That the world may see and know.*

—The Argosy.

ALFRED PANCOAST BOLLER.

*b. February 23, 1840. d.*

Pennsylvania, 1858; Reusselaer, 1861.

American bridge engineer. Designed the double-track bridge over the Hudson at Albany; the Eighth Avenue and the Madison Avenue bridges over the Harlem; the Croton Lake bridge, and the Central Avenue bridge, Newark, N. J.; the great gas-holder tanks of the Bay State Gas Company, in Boston; the tunnel under the light-house grounds, Staten Island; and the locomotive turn-tables on the West Shore Railroad, and other modern structures.

*High over the marge of the horrible deep*

*Hangs and hovers a bridge with its phantom-like span,  
Not by man was it built, o'er the vastness to sweep;*

*Such thought never came to the daring of man!*

*The stream roars beneath—late and early it raves—*

*But the bridge, which it threatens, is safe from the waves.*  
—*The Lay of the Mountain; SCHILLER.*

*Labor wields the axe and the spade, clears the forest and drains the morass, and makes the wilderness rejoice and blossom as the rose. Labor drives the plow, and scatters the seed, and reaps the harvest, and grinds the corn, and converts it into bread, the staff of life. Labor, tending the pastures and sweeping the waters, as well as cultivating the soil, provides with daily sustenance the one thousand millions of the family of man.*

—REV. NEWMAN HALL.

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MEMORANDA AND DIARY.

## FEBRUARY 24.

ROBERT FULTON.

b. 1765.

*d. February 24, 1815.*

American engineer and inventor. He patented a mill for sawing marble (1794); a machine for spinning flax, a dredging machine, a market or passage canal boat, and a machine for cutting cables of ships at anchor. In 1803 Fulton and Livingston built the first steam paddle boat and operated it on the River Seine. On August 11, 1807, the "Clermont" sailed on the Hudson to Albany. His first patent for improvements in navigation by steam was taken out on February 9, 1811. In 1796 he published his "Treatise on the Improvement of Canal Navigation."

*Well may we number, with admiring thought,  
The slow advances time and science wrought,  
Since enterprise, each danger prompt to brave,  
With her first feeble means essayed the wave;  
Since the small skiff, while toiled the laboring oar,  
Crept o'er the wave, and hugged the safer shore;  
Till, as the weary boatman marked the light  
And waving pinion speed the sea-gull's flight,  
And felt his arm grow powerless as he plied,  
While adverse beat the north wind's airy tide;  
Fired with new hopes he shaped the spreading sail,  
And winged his bark to drift before the gale;  
Thus, with alternate progress and delay,  
Ages on ages saw his timid way*

*Tread scarce more firm than while the world was young,  
Till when, at Fulton's call, invention sprung  
Instant to being, in full strength, and swayed*

JAQUES DE VAUCANSON.

b. February 24, 1709.

*d. November 21, 1782.*

French inventor. During the reign of Louis XV. he invented wonderful automata. In 1738 he exhibited his automaton flute player. The most wonderful and ingenious of his works of this kind was his automaton duck, which swam, quacked, dressed its feathers with its bill, and swallowed barley. He was appointed inspector of the silk manufactories, and invented some machines which were very useful in the fabrication of silk stuffs.

*Why should I not that Wooden Eagle mention?  
A learned German's tale admir'd invention,  
Which, mounting from his fist that fram'd her,  
Flew far to meet the German Emperor;  
And, having met him, with her nimble train  
Follow'd him close unto the castle gate  
Of Numerbery; whom all their show's of state,  
Streets hang with arras, arches curious built,  
Gray-headed senate, and youth's gallantries,  
Grac'd not so much as only this device.*

—DU BARTAS.

551 B. C.—The manufacture of silk was introduced from China by monks.

1839.—Sewing silk first manufactured at Mausfield, Conn.

*Her ready vassal steam's transcendent aid.*

—*The First Excursion of the Steamboat Washington;*  
CAPT. E. S. BUNKER.



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MEMORANDA AND DIARY.

## FEBRUARY 25.

STEPHEN GRAY.

- b. *d. February 25, 1736.* His experiments formed the starting-point of our knowledge of electric conduction. He was the first to divide all material substances into electrics and non-electrics. He also discovered that non-electrics could be transformed into the electric state by contact with disturbed and active electrics.

*Who knows the links of that invisible chain  
Which runs from soul to soul, from brain to brain,  
Whereby thought passes into other thought,  
And out of sound its silent shape is wrought?  
You see the miracle done before your eyes,  
And in the flash of spirit to spirit dies  
The common daylight; visual sense is blind  
To see how Matter is made quick by Mind.*

—A Tale of Eternity: GERALD MASSEY.

1888, Nov. 2.—Joseph Henry announced the discovery of secondary currents in electricity.

1842.—Henry proved that the discharge of a leyden jar was oscillatory, and the existence of waves in the ether produced by the discharge.

1860.—Plante invented the lead-cell storage battery.

1891, May, Paris.—The electric accumulator or secondary battery, a modification by M. Faure of Gaston Plante's powerful lead battery of 1860, was exhibited.

CAMILLE FLAMMARION.

- b. *February 25, 1842.* *d.*

French astronomer. Became noted as an aeronaut, a spiritualist, a meteorologist and an astronomer. He is the author of "Dieu dans la Nature" (1866); "Contemplations Scientifiques" (1868); "L'Astronomie Populaire" (1880 ?); "Urania" (1889).

*Tell us—for doubtless thou canst recollect,  
To whom should we assign the Sphinx's fame?*

*Was Cleopatra or Cephæus architect?*

*Of either pyramid that bears his name?*

*Is Pompey's Pillar really a misnomer?*

*Had Thebes a hundred gates, as sung by Homer?*

—Address to a Mummy: HORACE SMITH.

*I find nothing so singular in life as that everything appears to lose its substance the instant one actually grapples with it.*

—HAWTHORNE.

60 B. C.—Strabo wrote the first general geography.

160-125 B. C.—Hipparchus of Nicaea, in Bithynia. (first and greatest of Grecian astronomers), flourished.

He founded scientific astronomy, catalogued the stars, invented the planisphere, calculated eclipses, and discovered the eccentricity of the solar orbit, some of the inequalities of the moon's motions, and the procession of the equinoxes.

610-546 B. C.—Anaximander lived and made the earliest map of known portions of the earth.

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MEMORANDA AND DIARY.

## FEBRUARY 26.

ALOYS SENNEFELDER.

b. 1771. *d. February 26, 1834.*

German inventor of lithography, about 1798. The discovery was made by his making out his mother's wash-bill on a stone, having no paper. Subsequently he found the ink was so firmly set, that it occurred to him to eat away the stone, where not protected by the ink, with acid and leave the writing in relief. He printed some musical scores by this process, and in 1798 invented the process now known as lithography.

*There is no invention hath been more valued by  
the wiser part of mankind than that of letters.*

—SERMONS: STILLINGFLEET.

*Since creation began all that mortals have wrought,  
All that's godlike in man comes—the flash of a thought!  
For ages the stone in the quarry may lurk,  
An instant alone can suffice to the work;  
An impulse give birth to the child of the soul,  
A glance stamps the worth and the fame of the whole.*

—*The Favor of the Moment*: SCHILLER.

1796.—Lithography or drawing on stone was invented by Aloys Sennefelder, a Bohemian, at Munich, Bavaria.

1817.—Lithography was introduced; it was partially known since 1801. G. R. Hildgard made improvement in lithography by employing a zinc plate instead of stone.

1827.—First lithograph establishment completed at Boston; imported materials were used.

HENRY GEORGE KLOPPER KETCHUM.

b. *February 26, 1839.* *d.*

Canadian engineer. For five years engaged on the San Palo Railway of Brazil, and assisted in the construction of the famous Mogy Inclines, the large Mogy Viaduct, and the Cachoeira Tunnel. After investigation and surveys he constructed the Chignecto Ship Railway in Canada.

*All day the axe I hear rending through trunks,  
Moss-grown and reverend, of clusters 'd oaks.*

*All day the circling scythe sweeps off  
The ruddy bloom of vain-aspiring fields,  
Cipping to stubbles grim the vernal flowers.  
Thou portionest my meadows, and dost make  
Each fruitful slope a spot for sweaty toil.  
Thou tearest up my bosom: far within  
My golden veins the grimed miner's pick  
Startles the babbling echoes.*

—*The Song of the Earth*: GEORGE U. BOKER.

*The shortest and surest way to prove a work possible  
is strenuously to set about it; and no wonder  
if that proves it possible that for the most part  
makes it so.*

—DR. ROBERT SOUTH.

1854, April 30.—First railway in Brazil was opened.

1880.—Canada Pacific Railroad commenced.

1885, Nov. 8.—Canadian Pacific R. completed.

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MEMORANDA AND DIARY.

## FEBRUARY 27.

SOLOMON WILLARD.

b. June 26, 1783. *d. February 27, 1862.*

American architect. He became an expert wood-carver, his first important work in that art being the colossal spread eagle on the old Custom-house in Boston. In 1815 he began to carve in stone, and on November 2, 1825, was chosen architect and superintendent of the Bunker Hill monument. On July 23, 1842, the top stone was laid. With the help of Gridley Bryant, he introduced the free use of granite as a building material, and furnished the first granite paying stones used in Boston. He invented many ingenious plans for cutting and working stone.

*All men are builders from their youth ;*

*And life, the building time ;*

*And some build on the rock of truth,*

*And some on error's slime ;*

*And some shall sleep secure from harm,*

*When storms and floods assail ;*

*While some lie crushed beneath the weight*

*Of structures weak and frail.*

*Now, ye who build a warning tale,*

*Nor build upon the sand ;*

*But form a plan, and count the cost—*

*And work with steady hand ;*

*Until a structure strong and firm,*

*And founded on a rock,*

*Shall nobly rise, to greet the eyes,*

*And stand the tempest's shock.*

—All are Builders ; NATHAN A. WOODWARD, A. M.

DANIEL TREADWELL.

b. October 10, 1791. *d. February 27, 1872.*

American inventor and mechanic ; originally a watchmaker ; his first invention was a machine for producing wooden screws. In 1818 he devised a printing press, and in 1819 a power press, which he perfected and from which the first sheet was printed on this continent on a power press. In 1826 he designed a system of turnouts for a single railway track ; in 1829 he completed the first successful machine for spinning hemp for cordage ; in 1835 he perfected a method for making the process of Sir William Armstrong. His publications include "The Relation of Science to the Useful Arts" (1855) ; "On Constructing a Cannon of Great Calibre" (1856) ; and "On the Construction of Hooped Cannon," a sequel to the foregoing (1864).

*Honour and shame from no condition rise ;*

*Act well your part, there all the honour lies,*

*Fortun's in men has some small difference made ;*

*One flouts in rage, one futters in brocade ;*

*The cobbler apron'd, and the parson gown'd,*

*The friar hooded, and the monarch crown'd.*

*"What differ more," you cry, "than crown and coat ?"*

*I'll tell you, friend—a wise man and a fool ;*

*Or, cobbler-like, the parson will be drunk ;*

*Work makes the man, and want of it the fellow,*

*The rest is all but leather and prunella.*

—POPE.

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MEMORANDA AND DIARY.

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## FEBRUARY 28.

JOSEPH BARKER STEARNS.

AUGUSTUS ALLEN HAYES.

b. *February 28, 1831.*

d.

American electrical engineer and telegraph operator. He made many inventions in fire-alarm telegraph as now in use in the U. S. In 1868 he invented and patented the duplex system of telegraphy, now used throughout the world. In 1879-1880 he was employed in making, laying and putting in operation the cables between Galveston, Tex., and Vera Cruz, Mexico, and in 1881 he performed a similar service for the Central and South American Telegraph Company.

*Marvel! triumph of our day,*

*Flash all ignorance away;*

*Flash sincerity of speech,*

*Noblest aims to all who teach;*

*Flash till Power shall learn the Right,*

*Flash till Reason conquer Might;*

*Flash resolve to every mind*

*Mankind flash to all mankind.*

*Sing who will of Orphean lyre,*

*Ours the wonder-working wire!*

—*The Electric Telegraph*; ANONYMOUS.

1865, June 21.—A cable telegraph line was opened between Marsala, Sicily, and La Calle, Algeria.

1866.—The "Great Eastern" re-laid the Atlantic cable.

1894, Aug. 28.—The cable-steamer Mackay-Bennett arrived at New York with cable connecting New York, Nova Scotia and Ireland.

b. *February 28, 1806.*

d.

American chemist. In 1825 he began researches to determine the proximate composition of various American medicinal plants, which resulted in his discovering the organic alkaloid sanguinaria, a compound remarkable for the brilliant coloring of its salts. He first suggested the use of the oxides of iron in refining pig-iron, and still earlier, the refining of copper was, under his direction, rendered much shorter and more certain by the introduction of scales of oxide of copper.

*We must not only strike the iron while it is hot, but strike it till it is made hot.*

—SAMUEL SMILES.

*The men in cities who are the centres of energy, the driving-wheels of trade, politics, or practical arts, and the women of beauty and genius, are the children or grandchildren of farmers, and are spending the energies which their fathers' hardy, silent life accumulated in frosty furrows, in poverty, necessity and darkness.*

—*Farming*; EMBESON.

1561.—Copper mines were discovered in England.

1802.—The first sheet-copper manufactory in U. S., in Mass.

The discovery of copper is said to have preceded that of iron.



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## FEBRUARY 29.

ALEXANDER TILLOCH.

- b. *February 28, 1759.*      d. *January 26, 1825.*  
 Scotch inventor, who rediscovered the art of stereotyping; perfected in 1782. On January 11, 1825, he patented improvements in the steam engine.

*Little knew he what lay concealed  
 In the mystic art that he revealed—  
 The "art preservative of arts"—  
 This boon he gave, which still imparts  
 Light, Learning, Truth, and Liberty—  
 True glories of humanity!  
 His patient skill the art first taught—  
 To give enduring form to thought—  
 The mightiest of all human means  
 On which the hand of Progress leans.  
 Such the high province of the press!  
 And such its influence vast to-day,  
 Claiming this tributary lay,  
 For our Pantheon of High Fame  
 Enshrines full many a learned name.*

—To Gutenberg: FREDERICK SAUNDERS.

1725.—William Ged patented stereotyping, of which process he was the inventor.

1739.—An edition of Sallust was printed in Edinburgh from stereotype plates produced by Mr. Ged, a goldsmith.

1813.—A catechism was printed from stereotype plates in New York.

LEWIS SWIFT.

- b. *February 29, 1820.*      d.  
 American astronomer, who constructed his own apparatus and from his own plans. The great comet of 1862, and other heavenly bodies, were discovered by him. He invented a horse-hayrake (1842); an oxyhydrogen microscope (1858); an improvement in the construction of domes (1881); and an automatic right-ascension circle (1887). He has written cyclopædia articles and papers on various astronomical subjects.

*HIGHER! It is a word of noble import. It lifts the soul of man from low and groveling pursuits, to the achievement of great and noble deeds, and ever keeps the object of its aspiration in view, till his most sanguine expectations are fully realized.*

—HIGHER.

*In every occupation of life requiring intellectual, or even physical exertion, earnestness is an essential element of success. Without it, a man may have the strength of Hercules, or the mind of Newton, and yet accomplish nothing. He may live, and die, and yet leave behind him neither name nor memorial. Was there ever a man, of any trade or profession, eminently successful, who did not apply himself in earnest to his business?*

—ANONYMOUS.

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MEMORANDA AND DIARY.

# MARCH 1.

PETER BARLOW.

b. October

1776.

d. March 1, 1862.

English mathematician, physicist and optician. In 1817 he published "Essay on the Strength of Timber and Other Materials," which was the result of experiments in Woolwich dockyard and much-needed data for engineering calculations; in 1820, in an "Essay on Magnetic Attractions," he described a simple method of correcting ships' compasses. In an essay "On the Origin of Terrestrial Magnetism," January 27, 1831, he demonstrated the similarity between terrestrial magnetism and that of a wooden globe wound with copper wire carrying a galvanic current. He made early attempts at signaling with electricity. In telescopes he corrected color and curvature by a concavo-convex lens composed of a substance he found in carbon-disulphide, with equal refractive and twice the dispersive power of flint glass. To him belongs the credit of the first experiment involving the principle of the electric motor (1826).

*A colossal soul, he lies vast abroad on his times, uncomprehended by them, and requires a long focal distance to be seen; suggests, as Aristotle, Bacon, Selden, Humboldt, that a certain vastness of learning, or quasi omnipresence of the human soul in nature, is possible.*

—*Representative Men*: EMERSON.

1115 B. C.—Mariner's compass said to have been known in China.

VASILII IVANOVITCH BAZHENOV.

b. March 1, 1737.

d. August 2, 1799.

Russian architect. He was engaged in the preparation of the plans for the entire remodeling of the Kremlin, and designed the Kazan Church of St. Petersburg.

*The hasty multitude*

*Admiring enter'd; and the work some praise,  
And some the architect; his hand was known  
In heaven, by many a tower'd structure high,  
Where scepter'd angels held their residence,  
And sat as princes.*

—*Paradise Lost*: MILTON.

*The city's gone;*

*Naught but the leg remaining to disclose  
The site of that forgotten Babylon.*

*We wonder, and some hunter in yery express*

*Wonder like ours, when through the wilderness*

*Where London stood, hailing the wolf in chase,*

*He meets some fragment huge, and stops to guess*

*What wonderful, but unrecorded race*

*Once dwelt in that annihilated place.*

—*On A Stupendous Leg of Granite*: HORACE SMITH.

224 B. C.—The Colossus of Rhodes was thrown down by an earthquake.

570 B. C.—The hanging garden and many beautiful works of art were constructed by Nebuchadnezzar.

816 B. C.—Tarquinius Priscus laid the foundation of the Roman Capital; it covered eight acres. It was dedicated in 507 B. C.

672.—The Colossus of Rhodes was broken up by the Saracens. They sold the metal, 720,900 pounds of brass, to a Jew, who conveyed it on 900 camels to Alexandria.

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MEMORANDA AND DIARY.

## MARCH 2.

ZERAH COLBURN.

b. *September 1, 1804.* d. *March 2, 1840.*

American mathematical prodigy. When only six years old he began to manifest extraordinary powers of computation. His remarkable faculty for computation left him about the time he reached manhood.

*Nature is full of freaks, and now puts an old head  
on young shoulders, and then a young heart beating  
under fourscore winters.*

—OLD AGE: EMERSON.

*Precocious intellects portend  
A life of sorrow or an early death.*

*Go! dotard, go! and if it suits thy mind,  
Range yonder rocks, and reason with the wind;  
Or if its motions own another's will,  
Walk to the beach, and bid the waves be still;  
In newer orbits let the planets run,  
Or throw a cloud of darkness o'er the sun!  
A measured movement bid the comets keep,  
Or baffle the music of the spheres to sleep!  
These may obey thee, but the fiery soul  
Of genius owns not, brooks not their control.*

—THOMAS FURLONG.

139 A. D.—Claudius Ptolemaeus founded spherical trigonometry.

1822.—The theory of dimensions was laid down by Fourier in his *Theory of Heat*.

1843.—Sir Wm. Rowan Hamilton invented the mathematical method called the quaternions.

SAMUEL THOMAS SOEMMERING.

b. *January 25, 1755.*

d. *March 2, 1830.*

Made the first application of voltaic electricity to telegraphic purposes in 1809.

*Put golden padlocks on Truth's lips,  
Be cautious as ye will, all the world,  
From soul to soul o'er all the world,  
Leaps one electric thrill.*

—LOWELL.

*This discloses the true bearing of Science on poetry. The path from scientific discovery and practical invention to the great Author and Giver of the powers of nature is apt to be overtaken and overlooked. It is more easy "to look through Nature up to Nature's God," than it is to raise the mind from science up to the Author of all knowledge. But the mind once turned in this right direction, it is indisputable that science affords ample and unricotated materials for pious and truly poetic reflection.*

1833.—An optical signaling telegraph was made by the Marquis of Worcester.

1688.—Guillaume Amontons invented a system of telegraphy by means of signals from station to station.

1790.—An optical telegraph was made by Claude Chappe.

1837.—The electric telegraphs of Alexander and Davy were publicly exhibited in London.

1843.—Alexander Bain invented the chemical telegraph.

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## MARCH 3.

ALEXANDER GRAHAM BELL.

b. *March 3, 1847.*

Scotch-American inventor of the Bell telephone (1876) and the photophone. He first studied the art of enabling the deaf and dumb to enunciate intelligible words and sounds which they themselves had never heard; and in 1873 he transmitted musical tones by an electric circuit. With an old cigar box, some wire and two toy magnets, the first Bell telephone was made. The next year Bell brought the telephone to immediate practical value.

Philip Reis' invention was for the transmission of musical sounds, although it was used to transmit spoken words. The principles involved in it were first explained by Graham Bell in 1876. Bell, having produced the first practical instrument, is credited with the invention of the telephone. On the same day that Bell filed his patent, Professor Elisha Gray filed an application for an apparatus that was almost identical.

*Most wonderful art thou, O telephone!*

*Thou speakest language fitted to mine ear,*

*Thy tongue must be endowed with power its own,*

*That I in mine own language seem to hear.*

*It may be Greek, or French, or Saron tongue,*

*Still thou canst equally express the thought;*

*Canst carry notes by feathered songsters sung,*

*Or joyous news, with sweetest music fraught.*

—*The Telephone*; CHARLES W. SCARFF.

ANDREAS SIGISMUND MARGGRAF.

b. *March 3, 1709.*

*d. August 7, 1792.*

German chemist. He discovered that sugar could be procured from the beet. He discovered phosphoric acid; aluminum in 1754; magnesia in 1759; introduced into chemistry the study of reactions in the wet way, and thus laid the foundation of analytical chemistry. He recognized soda as an alkali, and magnesia and alumina as peculiar earths.

*By fire*

*Of sooty coal th' empiric alchemist*

*Can turn, or holds it possible to turn,*

*Metals of drossiest ore to perfect gold.*

—*Paradise Lost*; MILTON.

*The stone that all things turns at will*

*To gold, the chemist craves;*

*But gold, without the chemist's skill,*

*Turns all men into knaves.*

—HENRY FIELDING.

*Surely the generation which is now coming upon the theatre of action, has this great mission to perform. To them is held out a prize such as the world has never before offered, to stimulate the pride, patriotism, and ambition of any people. And they will profit by the opportunity. To those who have prepared themselves for the duties and the labors of this eminent undertaking, will fall the honors and rewards of the enterprise.*

—R. F. TROWBRIDGE.

1870.—First successful beet-sugar factory in United States was built at Alvarado, Cal.



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MEMORANDA AND DIARY.

## MARCH 4.

ISAAC LEA.

b. March 4, 1792. •

d. December 8, 1886.

American naturalist. In 1825 he began his memoirs on new forms of fresh-water and land shells, which he maintained throughout his life. In his "Fossil Footmarks on the Red Sandstones of Pottsville" (1852), he described the saurian footprints 700 feet below the conglomerate of the coal formation. This discovery was of great interest, for the existence of an air-breathing animal so low as the coal-measures had not been definitely accepted. The number of new forms, recent and fossil, that were made by him amounts to nearly 2,000. He bequeathed his collection of shells, minerals, fossils and geological specimens to the National Museum.

*Compared with this amazing edifice,  
Raised by the weakest creatures in existence,  
What are the works of intellectual man?  
Towers, temples, palaces, and sepulchres;  
Ideal images in sculptured forms,  
Egypt's grey piles of hieroglyphic grandeur,  
That have survived the language which they speak,  
Preserving its dead emblens to the eye,  
Yet hiding from the mind what these reveal;—  
Her pyramids would be mere pinnacles,  
Her giant statues, wrought from rocks of granite,  
But puny ornaments for such a pile  
As this stupendous mound of calcareous,  
Filed with dry mummies of the builder-worms.*

—Pelican Island.

ANTOINE ALPHONSE CHASSEPOT.

b. March 4, 1833.

d.

French inventor of the breech-loading rifle musket that takes the name of its inventor. It attracted much attention in consequence of its use by the French in the war with Germany (1870-1871).

*Arms have been taken from us, and warlike weapons of all kinds;  
Nothing is left but the blacksmith's sledge and the scythe of the mower.*

—*Evangeline*: LONGFELLOW.

*Shall this Samson, sightless with ignorance,  
And dungeon'd in servile terror,  
Ne'er bow in our temple of selfishness  
Against its columns of error,  
And make it a hideous sepulcher,  
Entombing his shame and our might?  
What wind shall quicken these skeletons,  
And flesh them for bust and slaughterers?  
Guard well, O lordly posterity!  
Thy treasures, thy delicate daughters,  
Keep arms within grasping! Set sentinels!  
The spoiler may come in the night.*

—*The Nameless People*: VAGAUTE.

1340.—Gunpowder was used in the Battle of Cressy.

1517.—Bavaria. The matchlock musket was invented at Nuremberg.

1617.—Muskets with flintlocks and battery were invented.

1650.—The flintlock musket was invented.

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## MARCH 5.

PIERRE SIMON LAPLACE.

*b. March 22, 1749.*

French mathematician. He first attracted the attention of the scientific world in 1772 by a paper on the integration of equations of finite differences. His principal works are "Theorie du Mouvement and de la Figure Elliptique des Planetes"; "Exposition du Systeme du Monde"; and "Traite de Mecanique Celeste." In conjunction with Lavoisier he invented the calorimeter; and he experimented on the decomposition of water, also a plan for perpetual moonlight.

*In pure logic, the doctrine of chances, which has been the logical guide of the exact sciences, and is destined to still higher uses, received at the hands of Jacob Bernoulli and of Laplace developments of the greatest importance.*

*Man never learns by experience. You may teach him authentic history as much as you please, and, in spite of it, he will continually re-enact the same faults and follies as ever.*

—The Snow Man: GEORGE SAND.

*But time convinced him that we cannot keep a breed of reasoners like a flock of sheep; For they so far from following as we lead, Make that a cause why they will not proceed. Man will not follow where a rule is shown, But loves to take a method of his own; Explain the way with all your care and skill, This will he quit, if but to prove he will.*

—The Dumb Orators: GEORGE CRABBE.

GIOVANNI VIRGINIO SCHIAPARELLI.

*b. March 5, 1835.*

*d.*

Italian astronomer. In 1860 he took charge of the observatory at Milan. He showed the relationship between cometary and meteoric matter in important papers published in 1866 and 1871.

*When coldness wraps this suffering clay,  
Ah, whither strays the immortal mind?  
It cannot die, it cannot stay,  
But leaves its darken'd dust behind.  
Then, unembodied, doth it trace  
By steps each planet's heavenly way?  
Or fill at once the realms of space,  
A thing of eyes, that all survey?*

—BYRON.

*The world goes round; the sun sets on despair,  
The morrow makes it hope. Each little life  
Thinks the great axle of the universe  
Turns on its fate, and finds impotence  
In joy or grief conflicting with its own.*

Lars: BAYARD TAYLOR.

*"The mind, when united with the soul and fully conversant with knowledge, embraces all objects."*

721 B. C.—The first eclipse of the moon observed by the Chaldeans at Babylon.

1836.—Quetelet discovered the periodicity of meteoric showers, occurring about the 10th of August.

1853.—Brussels. A maritime conference was held to obtain uniform meteorological observations.

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## MARCH 6.

MICHAEL ANGELO BUONAROTTI.

b. March 6, 1474. d. February 17, 1563.

Florentine sculptor and architect who, as a universal genius in the arts of design, has excelled every other artist. He was a pupil of Dominic Ghirlandajo, and studied statuary under Bartoldo. His reputation as an artist having been established at Florence, he was called to Rome by Julius II., where he remained chiefly in the service of the popes. He was employed on St. Peter's Church as an architect of the first order. His great painting of the Last Judgment was finished in 1541.

*Neat, in an urn, not void, though cold as thine,  
Moulders a godlike spirit's mortal shrine.  
Oh! Michael, look not down so still and hard!  
Speak to me,\* Painter, Builder, Sculptor, Bard!  
And shall those cunning fingers, stiff and cold,  
Grumble to meaner earth than they did mould?  
Art thou, who form and force to clay couldst give,  
And teach the quarried adamant to live,  
Bid—in the vaultings of thy mighty dome—  
Penitential, outvie imperial Rome,  
Portray unshrinking, to the dazzled eye,  
Creation, Judgment, Time, Eternity,  
Art thou so low, and in this narrow cell  
Doth that Titanic genius stoop to dwell;  
And, while thine arches brave the upper sky,  
Art thou content in these dark caves to lie?*

—Santa Croce: EDWARD EVERETT.

\* Michael Angelo, contemplating the statue of St. Mark, by Donatello, used to say, "Marco, perche non mi parli?"

JOSEPH VON FRAUNHOFER.

b. March 6, 1787. d. June 7, 1826.

German optician and physicist, who was at one time an apprentice to a manufacturer of mirrors. He invented or perfected a heliometer and micrometer, and in 1824 he constructed the great parallactic telescope of Dorpat. We owe to him the art of making the finest glass for achromatic telescopes. He discovered that the solar spectrum is crossed by about 590 black lines. In 1824 Fraunhofer successfully completed and perfected an object glass 9.9 inches in diameter for the Dorpat Observatory. This objective might literally have been called a "giant," for nothing approaching it in size had been previously made. Fraunhofer, who had been silently working away at the theory of lenses, and making various experiments in the manufacture of glass, was joined in 1805 by Guinard.

*They have sought deep into the earth—have sought*

*To rend all mystery from the earth and sky;*

*Making far worlds familiar unto thought—*

*Conferring power on the mind's sovereignty—*

*Pyramids which stand, and temples desolate,*

*In savage grandeur, show how men have striven;*

*Powerful, though impotent to cope with fate;*

*To save a name warring with earth and heaven.*

*Nor, erring, be they blamed—all speak a soul*

*Which earth may limit, but may not control!*

—Sonnet: RICHARD HOWITT.

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## MARCH 7.

ANDRE MICHAUX.

b. *March 7, 1746.*

d. *November 13, 1802.*

French botanist and explorer. He traveled in Persia, North America and other countries and studied their flora. He wrote "Description of the Oaks of North America" (1801) and "Flora of North America" (1803).

*Live fruitfully the life ye may possess  
With rootage beyond reach of consciousness,  
And wait till the Unseen in flower blows.  
To find that gems lie hidden where it grows  
Ye must not pluck the plant up by the root,  
Wait till its treasures hang in precious fruit.  
—A Tale of Eternity: GERALD MASSEY.*

*There is a scholarship which cannot see the forest  
for the tree—cannot see the truth for the facts.  
What matter? Let it catalogue the trees, and some  
man, truly the scholar, shall come some day and  
see it all, and cry, "Behold a forest!"*

—PHILLIPS BROOKS.

340 B. C.—Theophrastus studied botany.

1535.—English colonists for the first time saw the corn, sweet potato, and tobacco plant in North Carolina.

1718.—John Prout, Jr., produced linseed oil.

1892.—Piturne, a narcotic, was first extracted from the dried leaves of the *Duboisia picta*.

ROBERT RANSOME.

b. 1753.

d. *March 7, 1830.*

English manufacturer. In 1783 he patented cast-iron roofing plates; on March 18, 1785, he patented a tempered cast-iron ploughshare made by wetting the mould with salt water. In 1803 he made his greatest invention, viz.: the chilling of ploughshares by casting them on an iron mould. The practice is in universal use to the present day. In 1808 he made improvements in wheel and swing ploughs. The firm of Ransome & Sons was one of the earliest to build cast-iron bridges, the Stoke Bridge at Ipswich being constructed by them in 1819.

*And for many a day old Tubal Cain  
Sat brooding o'er his woe;  
And his hand forbore to smite the ore,  
And his furnace smoldered low;  
But he rose at last with a cheerful face,  
And a bright, courageous eye,  
And bared his strong right arm for work,  
While the quick flames mounted high;  
And he sang—"Hurrah for my handiwork!"  
And the red sparks lit the air—  
Not alone for the blade was the bright steel made  
And he fashioned the first ploughshare.*

—Tubal Cain: CHARLES MACKAY.

1770.—Cast steel was first made in Sheffield, England.

1827, May 27.—A patent was given Palliser for chilled metal shot, cast in cold iron moulds.



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## MARCH 8.

FREDERIC NEWTON GIBBORNE.

b. March 8, 1824.

d.

Canadian inventor. He was one of the operators of the Montreal Telegraph Company and opened its first station at Quebec. He successfully completed the telegraph line across Newfoundland in October, 1856. He has invented electric, pneumatic, and mechanical ship signals, anti-corrosive and anti-fouling compositions for the bottoms of iron ships, an electric recording target, and improvements in gas illumination.

*Your myriad trains o'er stagnant oceans tow,  
Harness'd with gossamer, the loitering prow;  
Or with fine films, suspended o'er the deep,  
Of oil effusive tuit the waves to sleep.  
You stay the flying bark, conceal'd beneath,  
Where living rocks of worm-built coral breathe;  
Meet fell Terebo, as he mines the keel  
With beaked head, and break his tips of steel;  
Turn the broad helm, the fluttering canvass urge  
From maelstrom's fierce innavigable surge.*

—Botanic Garden; DR. DARWIN.

1807.—Pall Mall was the first city lighted with gas.

1816.—Gas-lighting was introduced by Wilhelm A. Lampadius at Freiberg.

1814-20.—Gas-light was generally introduced in London.

1824.—A bold attempt was made at Birmingham to bring gas from the collieries, a distance of ten miles.

1841, May.—Sydney, Australia, was first lighted by gas.

ALVAN CLARK.

b. March 8, 1804.

d. August 19, 1897.

American optician; he was the first person to make achromatic lenses in the United States, and the best modern telescopes have been constructed at his factory at Cambridgeport, Mass. He invented numerous improvements in telescopes and their manufacture, including the double-eye-piece, an ingenious method of measuring small celestial arcs.

*It sweeps with eagle glances the sky, its myriad throng,  
That myriad to marshal and bring to us their song.  
Orb upon orb it follows, as oft they intertwine,  
And worlds in vast processions as if in battle line.  
It loves all things created to follow and to trace;  
And never fears to penetrate the dark abyss of space.*

—The Telescope; JOHN JONES.

*The far is near. We strain the lidless eye  
Whose glance like Faith's can penetrate the sky,  
Against the blue. The restless heavens swarm,  
With busy worlds before that breathless gaze  
As careless fleets caught out in tropic storm  
Slow thick as grain the ocean's fallow ways.*

—The Telescope; BENJ. F. TAYLOR.

1575.—Tycho Brahe erected an observatory, and founded the Tychonic system.

1850, Nov. 29.—Saturn's inner ring was discovered by Dawes and by Bond.

1863, Jan.—Alvan Clark was awarded Lalande prize, by French Academy, for his discovery of the "Companion of Sirius."

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## MARCH 9.

FREDERICK E. SICKLES.

b. 1819.

d. March 9, 1895.

American inventor. In 1842 he invented the well-known Sickles cut-off, the first successful drop cut-off. He was given the credit of the drop cut-off and dash-pot principles, but it is claimed that one Mr. Barber invented the first positive releasing gear and employed a dash-pot to catch the valve as it descended. Mr. Sickles introduced the "wiper" operated by a separate eccentric, or by a pin on the working beam, and allowed the cut-off at any point from zero to full stroke. 1840-1843 he received a patent for a differential motion, which was applied to steam hammers and to steam steering-gear, the first steam-operated steering gear.

*The men who are not satisfied—*

*They gird the world with wires;*

*They belt the land with rails of steel,*

*And pierce the air with spires;*

*They loose the leash of sweet content*

*With which mankind is tied,*

*We'll never pay the debt we owe*

*The men unsatisfied.*

—*The Great Unsatisfied*; W. D. NESBIT.

*I can't abide to see men throw away their tools in that way, the minute the clock begins to strike, as if they took no pleasure in their work and were afraid o' doing a stroke too much. \* \* \* The grindstone 'll go on a-turning a bit after you loose it.*

—GEORGE ELIOT.

ELIHU BURRITT.

b. December 8, 1810.

d. March 9, 1879.

America's "Learned Blacksmith." Apprenticed when a boy to a blacksmith, he worked at the trade twelve hours each day, and in less than thirty years he was known the world over as "the learned blacksmith." This was accomplished by an "invincible determination" to know something, in spite of his surroundings. He published "Sparks from the Anvil" (1845); "Miscellaneous Writings" (1850); and "Handbook of the Nations" (1856).

*And the smith his iron measures hammered to the anvil's chime;*

*Thanking God, whose boundless wisdom makes the flowers of poesy bloom*

*In the forge's dust and cinders, in the tissues of the loom.*

—Nuremberg; LONGFELLOW.

*Iron! Best of metals! Pride of minerals!*

*Heart of the earth! Hand of the world!*

*Which falls heavy when it strikes home.*

—*London's Temp.*; DEKKER.

*When'er a noble deed is wrought,*

*When'er is spoken a noble thought,*

*Our hearts in glad surprise,*

*To higher levels rise.*

—SANTA FILOMENA.

692 B. C.—Glaucus is said to have discovered the art of welding iron.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## MARCH 10.

LATIMER CLARK.

b. *March* 10, 1822.

d.

English electrical engineer and inventor. In 1853 he first witnessed the retardation of electric signals in submarine lines, and demonstrated that currents of low tension travel as fast as those of high tension. In 1853 devised a plan of obtaining stereoscope pictures with a single camera. He superintended the submergence of about 50,000 miles of submarine cables and invented the well-known covering for submarine cables called "Clark's Compound." He designed the double-cupped insulator and introduced the system of pneumatic tubes for the mechanical transmission of messages.

*Blessings on Science! When the earth seem'd old,  
'Twas Faith grew doting, and the Reason cold,  
'Twas she discovered that the world was young,  
And taught a language to its lisping tongue;  
'Twas she disclosed a future to its view,  
And made old knowledge pale before the new.*

—RAILWAYS; CHARLES MACKAY.

*But away, away, through the sightless air,  
Stretch forth your iron thread,  
For I would not soil my sandals fair  
With the dust ye tamely tread.  
Ay, rear it upon its million piers—  
Let it circle the world around,  
And the journey ye make in a hundred years  
I'll clear at a single bound!*

—The Song of Lightning; GEORGE W. CUTTER.

MARCELLO MALPIGHI.

b. *March* 10, 1628.

d. *November* 29, 1694.

Italian anatomist and naturalist, who was the first to use the microscope in the study of anatomy. He made discoveries in the structure of the skin and glands. He published, between 1661 and 1665, treatises "On the Lungs," "On the Tongue," and "On the Brain," and also wrote "Anatomie Plantarum" (1675), a science which he was one of the first to cultivate.

*Come forth into the light of things,  
Let Nature be your teacher.*

—WORDSWORTH.

*The paths of pain are thine. Go forth  
With healing and with hope;  
The suffering of a sin-sick earth  
Shall give thee ample scope.*

*No crusade thine for cross or grave,  
But for the living man.  
Go forth to succor and to save  
All that thy skilled hands can.*

*Before the unveiled mysteries  
Of life and death, go stand  
With guarded lips and reverent eyes,  
And pure of heart and hand.*

*So shalt thou be with power endued  
From Him who went about  
The Syrian hill-paths, doing good  
And casting devils out.*

—WHITTIER.

1904.

THURSDAY.

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MEMORANDA AND DIARY.

## MARCH 11.

URBAIN JEAN JOSEPH LEVERRIER.

b. *March* 11, 1811.

*d. September* 23, 1878.

French astronomer and physicist. From his study of the movements of Uranus he located the planet Neptune, 1846, mathematically, from the deviations of the planet from its normal path. From the determinations of Leverrier, Neptune was discovered on September 23, 1846, by Dr. Johann G. Galle of Berlin, at the place indicated by Leverrier. Leverrier acquired great celebrity by this discovery and was appointed professor of astronomy in the Faculty of Sciences, Paris.

*The brilliant advent of a world foretold  
No mortal eye had seen, and dared declare,  
What little else than inspiration dare,  
With finger pointed at the blank abyss,  
There lurks a world of sixteen globes like this  
All belted into one, that makes the rounds  
Along light's picket-hue and solar bounds."*  
"Now turn," this hero said, "the telescope  
Upon that realm beyond all daytime's hope,  
And you shall see that stranger coming in  
From regions where they never die nor sin!"  
The solemn clock that told the time of stars  
Beat through the silence like a signal gun—  
Then came a dimness as of filmy spars,  
Then in the telescopic field a dawn.  
Then clear and steady came the glory on.

*And lo, great Neptune surging round the sun  
On his long route three thousand million miles!  
He widened out our planetary realm,*

SIR CHARLES FOX.

b. *March* 11, 1810.

*d.*

British engineer and architect. Connected with the waterworks of Berlin; the bridges over the Rhone and Saone, near Lyons; the bridge over the Medway at Rochester; two bridges over the Thames; the Birmingham station; the Paddington station; the building for the great exhibition of 1851; and the Crystal Palace at Sydenham.

*The Master's Art,*

*Has made it so like in every part,*

*That there wasn't a chance for one to start.*

*For the struts were just as strong as the pins,*

*The rivets were just as strong as the fins,*

*And the panels just as strong as the floor,*

*And the counters neither less nor more.*

*And the back cross-bar as strong as the fore,*

*And rod, turn-buckle and post encore.*

*How it went to pieces all at once,*

*All at once—and nothing first—*

*Just as bubbles do when they burst.*

*—Adapted to Holmes' Wonderful One-hoss Shay.*

*Doubled the Solar System's rim.*

*The world of worlds grows vaster, and the dim*

*Thought falters, and is glad that God is at the Helm!*

*—The Discovery of Neptune; BENJAMIN F. TAYLOR.*

1846, Oct. 10.—Lassell discovered a satellite of Neptune.

1847.—Lassell discovered a satellite of Uranus.

1892, September 11.—Prof. Barnard discovered a fifth satellite to Jupiter.



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MEMORANDA AND DIARY.

## MARCH 12.

GUSTAV ROBERT KIRCHHOFF.

b. *March* 12, 1824.

d.

German chemist and astronomer. His earlier researches were devoted to various phenomena of electricity and galvanism, and he devoted considerable time to the study of the tension of steam. The spectroscope was invented by him and Robert Bunsen about 1859. He published "Researches on the Solar Spectrum" (1862).

*Higher paths there are to tread;  
Fresher fields around us spread;  
Other flames of sun and star  
Flash at hand and lure afar;  
Larger manhood might we share,  
Surer fortune—did we dare!  
In our mills of common thought  
By the pattern all is wrought;  
In our school of life, the man  
Drills to suit the public plan,  
And through labor, love and play,  
Shifts the Burden of the Day.*

—BAYARD TAYLOR.

*If the power to do hard work is not a talent, it is the best possible substitute for it.*

—JAMES A. GARFIELD.

*"Work faithfully, and you will put yourself in possession of a glorious and enlarging happiness."*

1704.—Newton published his Optics, first explaining the phenomena of the spectrum.

1804.—Fraunhofer compared the lines in the spectrum of the sun and stars.

WILLIAM HENRY PERKIN.

b. *March* 12, 1838.

d.

English chemist and inventor. His enduring fame is based on the discovery of the first aniline color. While investigating the artificial formation of quinine he obtained results that led to the discovery of "aniline purple," or "mauve," a discovery which laid the foundation of the industry of the coal-tar colors. He discovered that with artificial alizarine another coloring matter was associated—anthrapurpurine. In 1867 he published his first papers on salicylic aldehyde, showing that this substance is not only an aldehyde but also a phenol. This was the commencement of a series of researches which resulted in the artificial formation of coumarin and the discovery of several new bodies of this class. It led also to the discovery of a new reaction, known by his name, by which cinnamic acid could be easily obtained from benzaldehyde.

*Beneath us nature's laws are stretched afar,  
And vast designs of providence unseen.*

*Whither they lead we know not, but they are  
Substantial to our touch, on them we lean.*

*The ends they serve are greater than we know.*

*And larger than our little lives may span;*

*Yet faith may grow from feeling, as we find*

*In them a ministry divine for man.*

*Whatever else they are, yet this is best—*

*They are the stay whereon our souls may rest.*

—RITCHIE SMITH.

1904.

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MEMORANDA AND DIARY.

## MARCH 13.

JOHN FREDERIC DANIELL.

b. *March* 12, 1790. d. *March* 13, 1845.

English physicist and inventor. He made important improvements in the manufacture of sugar. In 1820, by the invention of the hygrometer which bears his name, he first gave precision to the means of ascertaining the moisture of the atmosphere. He invented the constant battery known by his name.

*The men who are not satisfied—*

*They are the ones who lead ;*

*By strident word and deed ;*

*They bring us out of bygone ways ;*

*They guide us through the dark*

*To where some man, unsatisfied,*

*Has set a shining mark.*

—*The Great Unsatisfied* : W. D. NESBIT.

*Men of genuine ambition never wait for uncertain events. They commence, as all men have to commence, with the very first steps of the foundation ; and while others, of perhaps better abilities and more fortunate condition, are nursing their morbid hopes and fading expectations, they build up the basis of a fortune and reputation, to which the less energetic and useful may aspire in vain. True men create circumstances, which, in turn, aid them.*

—R. F. TROWBRIDGE.

1659.—The sugar refining process was practised (perhaps previous to this date).

CHARLES BONNET.

b. *March* 13, 1720. d. *May* 20, 1793.

Swiss naturalist. In his "Treatise on Insectology" (1745) he gives the result of important discoveries of animal functions, and especially on the modes of reproduction of butterflies, caterpillars, etc. His treatise "On the Use of Leaves in Plants" (1754) is one of the best works on vegetable physiology. He also wrote "Contemplation of Nature" (1764).

*Nature never hurries ; atom by atom, little by little, she achieves her work. The lesson one learns in fishing, yachting, hunting, or planting is the manners of Nature ; patience with the delays of wind and sun, delays of the season, bad weather, excess or lack of water.*

—*Farming* ; EMERSON.

*Nature is a rag-merchant, who works up every shred and ort and end into new creations.*

—*Beauty* ; EMERSON.

978-988 B. C.—Natural history was studied by Solomon.

1583.—Caesalpinus classified plants by their flowers.

1813, *March* 13, 14.—Red snow and hail, with red dust, fell in Tuscany, and on April 15 red snow fell on Tonal and other mountains.

1890, *May* 15.—An extended shower of red dust was seen in many places.

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MEMORANDA AND DIARY.

## MARCH 14.

JAMES BOGARDUS.

b. *March* 14, 1800.

d. *April* 13, 1874.

American inventor. In 1828 he invented the "ring flier" for cotton-spinning; in 1829, an electric mill; in 1831, an engraving machine with which gold watch-dials were made, and also a transfer-machine for producing bank-note plates from separate dies; in 1832 the first dry gas-meter; and in 1836 he produced a medallion engraving-machine. His later inventions include a machine for pressing glass and an appliance for shirring India-rubber fabrics and for cutting India-rubber into fine threads. In 1848 he patented a sun-and-planet horse-power, and a dynamometer for measuring the speed and power of machinery while in motion. He invented a pyrometer of great delicacy, and a deep-sea sounding machine which can be used without a line and is very accurate.

*In science is work for all hands, more or less skilled; and he is usually the most fit to occupy the higher posts who has risen from the ranks, and has experimentally acquainted himself with the nature of the work to be done in each and every, even the humblest, department.*

—J. D. FORBES.

1798.—Lewis Paul secured a patent for a spinning-machine; it was unsuccessful.

1742.—First mill for spinning cotton erected at Birmingham, operated by mules, but not successfully.

ALBERT ARENTS.

b. *March* 14, 1840.

d.

German metallurgist; invented the siphon tap, now everywhere used on lead furnaces, the Eureka lead furnace, and the well-known roasting furnace that bears his name.

*Swift as the wind (his orders to pursue),  
To the black labors of the forge they flew;  
Vast heaps of steel in the deep furnace roll'd,  
And bubbling streams of brass, and floods of melted gold.  
Some with huge bellows rouse the roaring flame;  
Some in the stream the hissing metals drown'd,  
From vault to vault the thundering strokes rebound,  
And the deep cave rebellious to the sound.  
Exact in time each ponderous hammer plays;  
In time their arm the giant brethren raise,  
And turn the glowing mass a thousand ways.*

—PITT.

*Here, late and early, still the brand  
Kindled the smiths, with crafty hand;  
The bellows heave, the sparkles fly  
As if to melt the rocks on high.*

—FRIDOLIN: SCHILLER.

1781.—Henry Cort invented puddling, and introduced great improvements in the manufacture of iron.

1855, Oct. 17.—Capt. Henry Bessemer patented his process of manufacturing steel.

1876.—Ernst Werner and Sir Charles Siemens, by means of regenerative gas furnaces, produced excellent steel cheaply in large quantities.

1904.

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MEMORANDA AND DIARY.

## MARCH 15.

SIR SAMUEL BROWN.

b. , 1776. d. March 15, 1852.  
English engineer. His chain pier at Brighton is a beautiful object of suspensive power, and was begun in 1822 and opened in 1829. He was the first to construct a suspension bridge capable of sustaining heavy weights, such as carriages, etc. It was erected over the Tweed, at Kelso, in 1820. He patented in 1817 improvements in suspension bridges, the patent including a special link. He invented an improved method of manufacturing links for chain cables, and the experiments which he carried out led to the introduction of chain cables in the navy. He patented other naval and marine appliances.

*There's always a river to cross,  
Always an effort to make,  
If there's anything good to win,  
Any rich prize to take,  
Yonder's the fruit we crave;  
Yonder the charming scene;  
But deep and wide, with a troubled tide,  
Is the river that lies between.*

—Obstacles always Ahead.

*Learn from the birds what food the thickets yield;  
Learn from the beasts the physic of the field.  
Thy arts of building from the bee receive;  
Learn of the mole to plough, the worm to weave.*

—Essay on Man. FORT.

1825.—A chain suspension bridge was erected at Menai Strait W., by Thomas Telford.

HENRY BESSEMER.

b. January 19, 1813. d. March 15, 1898.  
English inventor of the Bessemer process of decarbonizing pig-iron while in a molten state, by blowing atmospheric air through it (1855). By the addition of carbon in the form of spiegeleisen steel is produced. He invented machinery for the manufacture of Bessemer gold and bronze powders, which process was not patented. He also invented a steel die, a machine for perforating legal stamps and a date canceller, and also various improvements in railway carriages, steam pumps, etc.

*Hence dusky iron sleeps in dark abodes,  
And ferny foliage nestles in the nodes;  
Till with wide lungs the panting bellows blow,  
And walked by fire the glittering torrents flow;  
—Quick whirls the wheel, the ponderous hammer falls,  
Loud anvils ring amid the trembling walls,  
Strokes follow strokes, the sparkling ingot shines,  
Flows the red slag, the lengthening bar refines;  
Cold waves, immersed, the glowing mass congeal,  
And turn to adamant the hissing steel.*

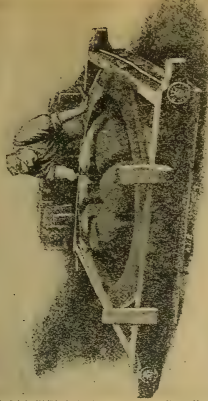
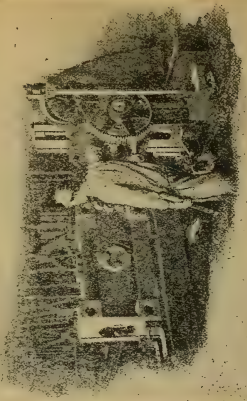
—Botanic Garden; DR. DARWIN.

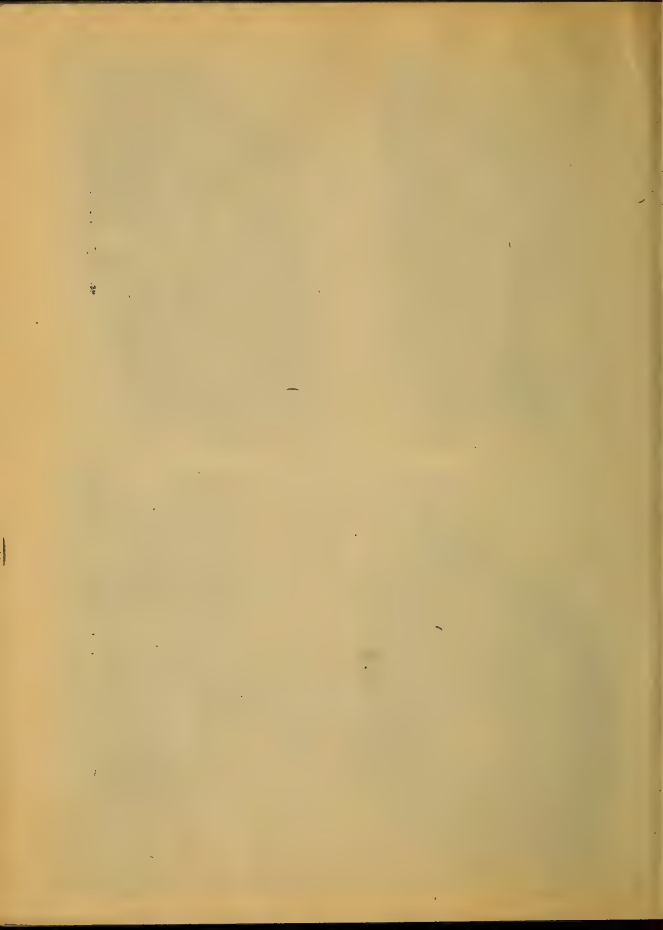
1784.—Henry Cort patented the process for shingling, welding, and manufacturing iron and steel into bars, plates and rods.

1839.—Josiah M. Heath patented the process of adding one per cent., or even less, of carburet of manganese to the melting-pot, with moulten blistered steel.

1850.—Reipe patented his process for puddled steel.







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MEMORANDA AND DIARY.

## MARCH 16.

JETHRO WOOD.

b. *March 16, 1774.*

d. 1834.  
American inventor of the modern cast-iron plough. He took out two plough patents, the first in 1814 and the second in 1819. The first was an improvement on any then in use, but was abandoned by him almost from the first. He claimed exclusive privileges for the mould-board, or plough-share; for a standard of cast-iron; for improvements in the cutting edge of the plough-share and for improvements in the mode of fitting, adapting and adjusting the cast-iron landside to the cast-iron mould-board.

*I am the central figure in all the world  
Which the horizon bounds, and other men  
Attend me as the planets do the sun;  
From me they draw all bounty, all support,  
And in my failure find their surest loss.*

—T. BERRY SMITH.

*The farmer bends to the order of the seasons, the weather, the soils and crops, as the sails of a ship bend to the wind. He represents continuous hard labor, year in, year out, and small gains. He is a slow person, timed to Nature, and not to city watches. He takes the pace of seasons, plants, and chemistry.*

—*Farming*; EMERSON.

1797.—Cast-iron ploughs introduced; at first objected to, it being claimed that cast-iron poisoned the ground.

1816.—Engines for plowing land were patented by David Ramsey and Thomas Wildgoose.

1837.—John Upton patented a steam-plough.

JOSEPH JENCKES.

b. 1802.

d. *March 16, 1883.*  
English inventor. He erected the first furnaces, made the first moulds, cast the first domestic utensils and manufactured the first machinery and iron tools, for he established the first "foundry and forge" in the colonies. He introduced to the colony the idea of patenting inventions. In 1646 he secured a patent for an improved water-wheel and also a newly invented saw-mill. In 1654 he built a fire-engine on the order of the selectmen of Boston—the first in this country. In 1655 he was granted a patent for an improved grass-scythe.

*Browning o'er, the pipes are simmering,  
Dip this wand of clay within;  
If then the casting wand be glimmering,  
Then the casting may begin.*

*Brisk, brisk now, and see*

*If the fusion flow free;  
If—happy and welcome indeed were the sign!—  
If the hard and the ductile united combine.*

—*The Lay of the Bell*; SCHILLER.

*Why do so few young men of early promise, whose hopes, purposes, and resolves were as radiant as the colors of the rainbow, fail to distinguish themselves? The answer is obvious; they are not willing to devote themselves to that toilsome culture which is the price of great success. Whatever aptitude for particular pursuits nature may donate to her favorite children, she conducts none but the laborious and the studious to distinction.*

—*Mind, the Glory of Man.*

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MEMORANDA AND DIARY.

## MARCH 17.

CHARLES FRANCIS BRUSH.

b. *March* 17, 1849.

d.

University of Michigan, M. E., 1869.

American electrician. The Father of electric lighting. He invented a device for lighting and putting out street gas-lamps by electricity. In 1876 he completed his first dynamo electric machine. In 1877 he invented his first commercial arc lamp. It was his famous series arc lamp, having a regulating shunt circuit of high resistance which first made commercial arc lighting from central stations possible. On this invention are based all the arc lighting systems in use throughout the world. Among his other inventions of early date are his copper-plated carbons for arc lights, his automatic cut-out for arc lamps, and his multiple carbon arc lamp for all-night burning.

*Gibbon was in his study every morning, winter and summer, at six o'clock; Mr. Burke was the most laborious and indefatigable of human beings; Leibnitz was rarely out of his library; Pascal killed himself with study; Cicero narrowly escaped death by the same cause; Milton was at his books with as much regularity as a merchant or an attorney; he mastered all the knowledge of his time; so did Homer. Raphael lived but thirty-seven years, and in that short space carried his art so far beyond what it had before reached that he appears to stand alone as a model to his successors.*

—*Labor and Genius*; SIDNEY SMITH.

SIR JAMES EDWARD SMITH.

b. 1759.

d. *March* 17, 1828.

The first president of the Linnean Society, who devoted himself chiefly to botanical studies. Besides his translations from Linne and others, his leading original works are "English Botany," the "Flora Graeca" (in conjunction with Dr. Sibthorpe), "A Tour on the Continent," and "Flora Britannica."

*The mountain and the squirrel*

*Had a quarrel;*

*And the former called the latter "Little Prig";*

*Bun replied, "You are doubtless very big;*

*But all sorts of things and weather*

*Must be taken in together,*

*To make up a year and a sphere.*

*And I think it no disgrace to occupy my place. \* \**

*I'll not deny you make*

*A very pretty squirrel track;*

*Talents differ; all is well and wisely put;*

*If I cannot carry forests on my back,*

*Neither can you crack a nut."*

✓ *Fable*: EMERSON.

*Each flower some chosen emblem is; one is for beauty's bloom;*  
*Another friendship claims; a third sheds fragrance o'er the tomb;*

*But link'd with holy memories, to penitence how dear;*

*Thy shrine is aye the broken heart, thy dew contrition's tear.*

—*Moral of Flowers.*

1788.—The Linnean Society was organized in London; it was chartered in 1802.

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MEMORANDA AND DIARY.

## MARCH 18.

VALENTINE HAUY.

b. November 13, 1745. d. March 18, 1822.

French philanthropist. Founded institutions for the blind where he taught them how to read and write by inventing raised letters and ciphers.

*Sublime Philosophy!*

*Thou art the patriarch's ladder, reaching heaven,  
And bright with beckoning angels; but, alas!  
We see thee, like the patriarch, but in dreams,  
By the first step, dull stumbling on the earth.*

—*Richelieu*: BULWER-LYTTON.

*For the grist as it rolled down the hopper's great throat  
Like a stream of fine gold in its flight,  
Seemed to know, down below, it would soon shed its coat  
And be ground into flour so white.  
Yet the grist made no murmur of discord or strife,  
As through process it rapidly whirled,  
For no doubt it found out the true secret in life  
Is to yield for the good of the world.*

—*The Grinding of the Mills*: CHAS. W. SCARFF.

*It is a cruel mortification, in searching for what is instructive in the history of past times, to find the exploits of conquerors who have desolated the earth, and the freaks of tyrants who have rendered nations unhappy, are recorded with minute and often disgusting accuracy—while the discovery of useful arts, and the progress of the most beneficial branches of commerce, are passed over in silence, and suffered to sink into oblivion.*

—*Robertson's India*.

1570.—Pedro de Leon made the first systematic attempt to instruct the deaf and dumb.

DAVID LIVINGSTON.

b. March 19, 1813. d. May 1, 1873.

Scottish missionary and African explorer. He worked in a cotton factory in his youth, and was sent by the London Missionary Society to South Africa in 1840. He traveled in the interior of Africa for sixteen years and made important discoveries, returning to England in 1856. In 1858 he again went to Africa with the intention of exploring the river Zambesi, to promote the production of cotton, and to open commercial intercourse with the natives of that region. He returned in 1864 and in 1865 set out to explore westward from Zanzibar. He published a "Narrative of an Expedition to the Zambesi" (1865).

*For unknown ages, 'mid his wild abode,  
Speechless and rude, the human savage trode;  
By slow degrees expressive sounds acquired,  
And simple thoughts in words uncouth attired.  
As growing wants and varying climes arise,  
Excite desire and animate surprise,  
Gradual his mind a wider circuit ranged,  
His manners softened and his language changed,  
And grey experience, wiser than of yore,  
Bequeath'd its strange traditional lore.*

—*To Dr. Darwin*: E. H. SMITH.

1872, March 14.—Livingston was found by Stanley.

1893, March 14.—Samuel Baker discovered Lake Albert Nyanza, supposed to be a source of the Nile.



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MEMORANDA AND DIARY.

# MARCH 19.

JOSEPH L. FIRM.

b. *March* 19, 1837.

American inventor; made improvements in printing machinery, and invented and secured patents on presses, web perfecting presses and paper-folders; inventor of a process of printing on glass from electrotype plates, in colors or otherwise.

*Beware then, Age, that what has won,*

*If life's past labors, studies, views,*

*Be lost not, now the labor's done,*

*When all thy part is—not to lose:*

*When thou canst toil or gain no more,*

*Destroy not what was gain'd before.*

—*Reflections*; CRABBE.

*On its broad bosom it bears a thousand barks.*

*There genius spreads its purpling sail. There*

*poetry dips the silver oar. There art, invention,*

*discovery, science, morality, religion, may safely*

*and securely float. It wanders through every land.*

*It is a genial, cordial source of thought and in-*

*spiration, wherever it touches, whatever it sur-*

*rounds. Upon its borders there grows every flower*

*of grace, and every fruit of truth.*

—*Liberty of the Press*; COL. E. D. BAKER.

1823, June.—Printing by steam power. Murray's English Grammar printed in New York.

1824.—The first newspaper was published in Dutch and English.

1842.—A general issue of Works, in weekly sheets or numbers, at twopence each, was commenced by Robert Cadell of Edinburgh and completed in 1847.

FERDINAND BERTHOUD.

b. *March* 19, 1727.

Swiss inventor of marine clocks; the first to firmly establish the theory upon which machines for the measurement of time in common use are constructed.

*Live so that your yesterdays may be blessings,  
your to-days, opportunities, and your to-morrows,  
rewards.*

*But what do I hear that low in my ear*

*Nor hurries, nor tarryes, nor stays,*

*According its own perpetual tone*

*To the tune of the seconds and days?*

*'Tis the throb in the breast with its ceaseless dehest,*

*It leads in the temporal chime;*

*O, thou beat of the heart, life's pendulum art*

*For eternity's children in time.*

*Then why should we with other voices to still*

*When, unsilenced, our earthly for aye,*

*The heart with its beat will ever repeat,*

*"I measure till measureless day."*

—*The Two Clocks*; SELMA WARE PAINE.

1370.—Paris. A perfect clock was made by Vick; three clocks were placed on public buildings.

1580.—The manufacture of watches was begun in England; it was brought from Germany; Cornelius Van Dreble and James Torrianiellus were the earliest and greatest English watchmakers.

1700.—George Graham invented the dead-beat and horizontal escapements for watches.

1725.—Marine watches were invented by John Harrison.

1904.

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MEMORANDA AND DIARY.

## MARCH 20.

FORBURN OLOFF BERGMANN.

b. *March* 20, 1735. d. *July* 8, 1784.

Swedish chemist and naturalist. He made many important discoveries on the nature of fixed air and the causes of volcanoes. He first discovered that fixed air was an acid, and wrote a memoir entitled "On the Aerial Acid" (1774). He ascertained the distinctive characters of nickel, analyzed many mineral substances with great accuracy, and published a classification of minerals, in which the grand divisions are founded on the chemical nature of the substance. By the application of geometry to the forms of crystals he laid the basis of crystallography.

*The fire beneath the crucible was out ;  
The vessels of his mystic art lay "round,  
Useless and cold as the ambitious hand,  
That fashioned them ; and the small rod,  
Familiar to his touch, for threescore years,  
Lay on th' alchemic's rim, as if it still  
Might see the elements at its master's will.*

—*The Dying Alchemist* : N. P. WILLIS.

*Every chemical substance, every plant, every animal in its growth, teaches the unity of cause, the variety of appearance.*

—*History* : EMERSON.

1755.—Black discovered carbonic acid gas, called "fixed air."

1766.—Cavendish discovered hydrogen called "inflammable air."

JEAN DE HAUTEFEUILLE.

b. *March* 20, 1647. d. *October* 18, 1724.

French mechanician. Among his inventions is the spiral spring which regulates the movements of the balance of a watch (1647). This invention was also claimed by Huyghens.

*Surprising falls the instantaneous calm,  
The sudden silence in my chamber small ;  
I, starting, lift my head in half alarm—  
The clock has stopped—that's all.*

*The clock has stopped ! Yet why have I so found  
An instant feeling almost like dismay ?  
Why note its silence sooner than its sound ?  
For it has ticked all day.*

*So many lives beside my own go on,  
And such companionship unheeded keep—  
Companionship scarce recognized ere gone  
And lost in sudden sleep.*

—*The Stopping of the Clock* : G. H. COOMER.

1641.—The pendulum was constructed at London by Richard Harris, a clockmaker, and the younger Galileo.

1657-59.—Dr. Robert Hooke claimed to have discovered the method of regulating the movement of watches by means of a balance-wheel.

1695.—The cylinder and escapement for watches was invented by Thomas Tompion.

1850.—The first watch factory in the United States was started by Dennison and Howard at Boston, but was removed to Waltham, Mass.

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MEMORANDA AND DIARY.

## MARCH 21.

DAVID BATES DOUGLASS.

b. *March* 21, 1790. *d. October* 19, 1849.

American civil engineer. In 1831 he became chief engineer of the Morris Canal; his introduction of inclined planes in place of locks for canal navigation proved a success on the completion of the canal in 1832; in 1835 he became the chief engineer in the work of supplying the City of New York with water from the Croton River, but was superseded, after which he planned and laid out Greenwood Cemetery, Brooklyn, in 1838. He designed the supporting-wall for Brooklyn Heights, and the water supply of the City of Brooklyn.

*Look now abroad—another race has filled*

*These populous borders—wide the wood recedes,*

*And towns shoot up, and fertile realms are tilled;*

*The land is full of harvests and green meads;*

*Streams numberless, that many a fountain feeds,*

*Shine, disembowered, and give to sun and breeze,*

*Their virgin waters; the full region leads*

*New colonies forth, that toward the western seas*

*Spread, like a rapid flame, among the autumnal trees.*

—*The Western World*: WILLIAM C. BRYANT.

*I will tell you my rule: Talk about those subjects you have had long in your mind, and listen to what others say about subjects you have studied but recently. Know edge and timber shouldn't be much used till they are seasoned.*

—OLIVER WENDELL HOLMES.

1831.—Morris Canal was opened.

RENE DES CARTES.

b. *March* 21, 1596. *d. February* 11, 1650.

French mathematician and philosopher. His philosophy was taught in many universities, but gave way to that recommended by Bacon. His discoveries of the laws of refraction made dioptics a science. It is now proved that he was indebted to Thomas Harriot for the algebraic mode of notation. Probably no man has given a greater impulse to mathematical inquiry. He first successfully applied algebra to geometry; he pointed out the law of the sines. In an age in which optical instruments were very imperfect he discovered the changes to which light is subjected in the eye by the crystalline lens.

*How weak and fragile is the straining thread*

*That holds a life: A second—it is gone!*

*How soon may sink the most illustrious head*

*A thousand leagues deep in oblivion!*

—LOWELL O. REESE.

*Parallelograms of virtue,*

*Hunts from human frailty free,*

*Squares that vice can ne'er do hurt to,*

*Circles of New Harmony;*

*Schemes that blossom while we view 'em,*

*Swamp and prairie changed to park:*

*Meum melting into tuum—*

*Wondrous Owen of Lanark!*

*Owen of Lanark: JAMES SMITH.*

*Every man's work shall be made manifest: for the day shall declare it . . . and the fire shall try every man's work.*

—1 Corinthians, chapter 3.

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MEMORANDA AND DIARY.

## MARCH 22.

RAYMOND DI SANGRO SANSEVERO.

- b. 1710. *d. March 22, 1771.*  
 Italian artist and engineer; made many discoveries in mechanics, hydraulics, fortification, painting, and other sciences and arts. Among his mechanical inventions was a four-wheeled vehicle to pass over the surface of the water, which he exhibited on the bay of Naples.

*Better to stem with heart and hand  
 The roaring tide of life than lie,  
 Unmindful, on its flowery strand,  
 Of God's occasions drifting by!  
 Better with naked nerve to bear  
 The needles of this goading air  
 Than, in the lap of sensual ease, forego  
 The godlike power to do, the godlike aim to know.*

—WHITTIER.

*The mind is the glory of man. No possession is so productions of real influence as a highly cultivated intellect. Wealth, birth, and official station may, and do secure to their possessors an external, superficial courtesy; but they never did, and they never can command the reverence of the heart.*

—Mind, the Glory of Man.

- 1820.—The submarine ship was invented by Drebber in Netherland.  
 1816.—Iron ships were constructed.  
 1898.—Simon Lake completed and tested his submarine boat the "Argonaut."

CHARLES DANFORTH.

- b. 1797 (?) *d. March 22, 1876.*  
 American inventor of a counter-twister, spinning-speeder, and a throstle-frame (1824). In England he invented a cap-spinning frame, a bobbin, and a flyer.

*Your cotton-spinning and thrice-miraculous mechanism, what is this too, by itself, but a larger kind of Animalism? Spiders can spin. Beavers can build and show contrivance; the Ant lays up accumulation of capital, and has, for aught I know, a Bank of Antland. If there is no man higher than all that, did it reach to sailing on the cloud-rack and spinning sea-sand, then I say, man is but an animal, a more cunning kind of brute; he has no soul, but only a succedaneum for salt.*

—Past and Present; CARLYLE.

- 1830.—Jurgon of Brunswick invented a spinning-wheel.  
 1754.—John Harrison was voted £50 by the Society of Arts in London for a "masterly improvement of the spinning-wheel."  
 1761.—The first patent for the spinning-wheel was granted to Sir Richard Arkwright (which he further improved).  
 1764.—James Hargreaves invented the spinning-jenny.  
 1795.—Spinning machinery, worked by steam, was introduced at Glasgow, Scotland.  
 1798.—Spinning by machinery was introduced into Saxony.



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MEMORANDA AND DIARY.

## MARCH 23.

AUGUST GEMUNDER.

b. *March* 22, 1814.

d.

German violin maker. He succeeded in producing a violin which has since been used as a model. At one time he was in partnership with his brother George, who was also a violin maker.

*Then came a time when peasants of the Rhone  
With sturdy ax-stroke laid the pine-tree prone,  
Driving it stream-wise to the vale below ;  
Then peeled the bark—closed eyelid of its dream—  
And shaped the log into a massive beam,  
And brought it close in touch with human woe.*

*As tree-life passed into the beam of wood,  
So beam-life passes into fiddlehood.*

*The last Nirvana of the chosen tree,  
Where breast of pine and back of maple meet,  
Two souls of sound, with memories replete,  
That lose themselves in one, like waves at sea.*

—The Violin; ALFRED LEE DONALDSON.

*Lamech was the head of a family of inventors.  
Jubal, his son, invented wind and stringed instruments of music. The father of all such that handle the harp and the organ. Tubal Cain and Jubal were also his sons.*

1558.—Musical notes were printed with movable type by J. Sanliquo.

1580.—Gaspar di Salo originated the double-bass violin.

1677.—Violins were introduced.

WILLIAM SMITH.

b. *March* 23, 1769.

d. *August* 28, 1839.

English geologist. Called the Father of English Geology. He was the first in England to discover the constancy in the order of the superposition of strata. He published the first "Geological Map of England" (1801).

*To the natural philosopher the rocks and the mountains are the grand monuments of nature, on which is inscribed the history of the physical revolutions of the globe, which took place in periods incalculably remote, and the long antecedent to the creation of the human race. They present to his mind a succession of events, each so vast as to be beyond his finite comprehension; ages of tranquillity, with lands and seas teeming with life and happiness, succeeded by periods in which the earthquake and the volcano spread universal ruin and destruction; and they teach him that all these awful changes bear the impress of the Almighty hand, and were subservient to the eternal purpose of rendering this planet the fit abode of Man during his mortal pilgrimage.*

—MANTELL.

63 A. D.—Herculeum was seriously injured by a violent earthquake, and August 24, 79, it, together with Pompeii and Stabiae, was buried by the eruption of Vesuvius. 200,000 lives were lost.

1755.—An earthquake at Lisbon, Portugal, engulfed 80,000 inhabitants.

1902, May 8.—The destructive eruption of Mt. Pelee, Island of Martinique, occurred, destroying the entire population of St. Pierre.

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MEMORANDA AND DIARY.

## MARCH 24.

JOSEPH PRIESTLEY.

b. March 24, 1733.

d. February 6, 1804.

English chemist and physicist. He discovered that charcoal is a conductor of electricity. In 1772 he announced a method of impregnating water with fixed air, and the discovery of nitrous gas and its use as a test of the purity and fitness for respiration of gases generally. He employed the burning lens in pneumatic experiments; he discovered the properties of muriatic acid gas, and added much to what was known of the gas generated by putrefactive processes and by animal fermentation; and he determined many facts relative to the diminution and deterioration of air, by the combustion of charcoal and the calcination of metal. In 1774 he produced oxygen from the oxides of silver and lead; also nitrous, carbonic-oxide, fluoric-acid, muriatic and other gases.

*Sylphs! you, retiring to sequester'd bowers,  
Where oft your Priestley woos your airy powers,  
On noiseless step or quivering pinion glide,  
As sits the Sage with Science by his side;  
To his charm'd eye in gay undress appear,  
Or pour your secrets on his raptur'd ear.  
How nitrous Gas, from iron ingots driven,  
Drinks with red lips the purest breath of heaven;  
How, while Conferva, from its tender hair,  
Gives in bright bubbles empyrean air,  
The crystal floods phlogistic ores calcine,  
And the pure Ether marries with the Mine.*

—Botanic Garden; DR. DARWIN.

HORACE PARNELL TUTTLE.

b. March 24, 1839.

d.

American astronomer. In 1857 he invented a method of inserting a steel rifled cord into brass or iron cannon, which method is extensively used by European countries, but a patent for which was refused by the United States patent office. In 1861 he devised a method of signalling at long distances by using flashes made by a Drummond light, to correspond to the dots and dashes of the Morse telegraph system. He discovered thirteen comets between 1857 and 1866, and in 1861–1862 the asteroids Maia and Clytie. He computed the Pay Tables of the United States Navy (Washington, 1872).

*I want the genius to conceive,*

*The talents to unfold*

*Designs—the vicious to retrieve;*

*The virtuous to uphold;*

*Inventive power, combining skill;*

*A persevering soul,*

*Of human hearts to mold the will,*

*And reach from pole to pole.*

—The Wants of Man; JOHN QUINCY ADAMS.

*Wisdom consists in rating everything at its just value, and always grasping the greater good, though it may not be the nearer, or first to be enjoyed.*

—MRS. WILLARD.

600. B. C.—Chaldean. A chart of the heavens was made, in which 1,460 stars were correctly described.

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MEMORANDA AND DIARY.

## MARCH 25.

CHARLES LATIMER.

b. *September 7, 1827.*

d. *March 25, 1888.*

American engineer. He invented a system of naval signals by lights, upon which Coston's signals were based; a safety-guard for railway bridges; and a method of returning to the track trains that have been derailed. He published "The Divining Rod" (1876); the "Road-Master's Assistants" (1878); and "Battle of Standards" (1880).

*Heroes who conquered many a field*

*Of hard and sterile soil—*

*Who made the sturdy forest yield*

*To unremitting toil;*

*Heroes who did not idly stand,*

*But dealt such fearful blows*

*That acres, broad, of worthless land*

*Now blossom like the rose.*

—*Heroes of Industry: G. P. R.*

*Truth and life are always pressing on each other. They cross each other on grade, and are always in collision. Orthodoxy is an attempt to carry truth over life on a safe bridge. The result of the attempt to make truth safe is that what you ultimately make safe is not truth.*

—*PHILIPS BROOKS.*

1084 B. C.—Emperor Wangi invented weapons, wagons, ships, clocks, musical instruments, and introduced coins, weights and measures.

Greek fire, a combustible composition to be thrown from engines was invented by Callinicus, an engineer of Heliopolis, Syria.

JUAN ANTONELLI.

b. *about 1550.*

d.

1616.

Italian engineer; made the plans and superintended the construction of Morro Castle and Punta Fortress in Havana; in 1589, he went to Vera Cruz, Mexico, and planned the famous fortress of San Juan de Ulua.

*Now last of all, a builder built,*

*Who was a wiser man;*

*He counted cost—and sought a rock,*

*And had a noble plan;*

*He built a structure high and large,*

*And strengthened it with care;*

*And when the building was complete,*

*He sought a refuge there.*

—*All are Builders: NATHAN A. WOODWARD.*

*Sum up at night what thou hast done by day;*

*And in the morning what thou hast to do;*

*Dress and undress thy soul, mark the decay*

*And growth of it; if with thy watch that too*

*Be down, then wind up both.*

—*HERBERT.*

400 B. C.—The Chinese wall was built (?).

312 B. C.—The Appian Way was commenced by Appius Claudius Cæcus, and connected with Capua.

308 B. C.—The Appian Way was completed.

64.—Rome was rebuilt on a grand scale. Nero erected a magnificent golden palace which enclosed green lawns.

69.—Vespasian erected the Colosseum at Rome.

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MEMORANDA AND DIARY.

## MARCH 26.

NICHOLAS HARTSÖEKER.

b. *March* 26, 1656. d. *December* 10, 1725.

Dutch metaphysician, geometrician and natural philosopher. He discovered the spermatie animalcules and thus afforded ground for a new theory of generation. He constructed telescopes. Among his works are "Essay on Dioptrics"; "A Course of Natural Philosophy;" and "Physical Conjectors." He claimed the discovery of the microscope.

*Surely as knowledge that doth rest at last  
Isled on its 'ATOM,' in the unfathomed vast  
Life-ocean, heaving through the infinite,  
From out whose dark the shows of being flit,  
In flashes of the climbing wave's white crest;  
Some few a moment luminous o'er the rest.*

—A Tale of Eternity; GERALD MASSEY.

*Far beyond the murky midnight,  
By dim burning of my oil,  
Filling aye his rapid leaflets,  
I have watched him at his toil;  
Watched his broad and scamy forehead,  
Watched his white, and industrious hand,  
Ever passing and repassing;  
Watched, and strove to understand  
What impelled it—Gold, or fame—  
Bread, or bubble of a name.*

443 B. C.—Athens. The burning lens was used.

50.—Seneca mentioned the magnifying power of convex lenses; also concave mirrors and the prismatic colors.

COUNT RUMFORD, BENJAMIN THOMPSON.

b. *March* 26, 1753. d. *August* 21, 1814.

American-born scientist. He investigated heat and the amount of it produced by the combustion of different kinds of fuel, by means of a calorimeter of his own invention. The work that has been done to demonstrate experimentally the doctrine of the "correlation of forces" was begun by him in a series of experiments that were suggested by the heat evolved in boring cannon.

*What God is this imperial Heat,  
Earth's prime secret, sculpture's seat?  
Doth it bear hidden in its heart  
Water-line patterns of all art,  
Is it Daedalus? is it Love?  
Or walks in masks almighty Jove,  
And drops from Power's retundant horn  
All seeds of beauty to be born?*

—May-Day; EMERSON.

*Talent is something, but tact is everything.  
Talent is serious, sober, grave and respectable; tact  
is all that, and more, too. It is not a sixth sense;  
but it is the life of all the five. It is the open eye,  
the quick ear, the judging taste, the keen smell, and  
the lively touch; it is the interpreter of all riddles,  
the surmounter of all difficulties, the remover of all  
obstacles. It is useful in all places, and at all  
times; it is useful in solitude, for it shows a man  
his way into the world; it is useful in society, for  
it shows him his way through the world.*

—Talent and Tact; ADDISON.



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## MARCH 27.

CONRAD WILHELM RONTGEN.

b. *March 27, 1844, or '45.*

d.

German scientist. Discoverer of the X or Röntgen rays, November 8, 1895, but not communicated to the public until January, 1896. The essential part of the apparatus is a small glass tube, into each end of which is fitted a wire carrying a high potential electric current. The tube being exhausted, the electric circuit is broken by the vacuum space in the tube, causing an intense luminosity, the rays of which will penetrate and traverse opaque substances and act upon a sensitized photographic plate. The apparatus is employed to photograph opaque objects contained within a less opaque object, as the bones, or any foreign substance in the human body.

*The awful walls of shadowous round might dusky mountains seem,*

*But never holy light hath touched an outline with its gleam ;*

*'Tis but the eye's bewildered sense that fain would rest on form,*

*And make night's thick blind presence to created shapes conform.*

*No sun here shines on wanton isles ; but o'er the burning sheet*

*A rim of restless halo shakes, which marks the internal heat ;*

*As in the days of beauteous earth we see, with dazzled sight,*

*The red and setting sun o'erflow with rings of welking light.*

—THOMAS ARD.

1850.—Loen Foucault and Hippolyte Louis Fizeau made important improvements in photography, and developed the theory of light.

JAMES ALFRED EWING.

b. *March 27, 1855.*

d.

English scientist and inventor. Assisted Lord Kelvin in his engineering work. While in Japan he gave special attention to the study of earthquakes, and devised seismographs by which a complete analysis of the motion of the ground was obtained. He has given much attention to electricity and its applications and especially to the study of magnetism. His "Hysteresis Tester" and "Permeability Bridge" are practical instruments of magnetic measurement.

*Diseased nature oftentimes breaks forth*

*In strange eruptions ; oft the teeming earth*

*Is with a kind of colic pinch'd and vex'd*

*By the imprisoning of unruly wind*

*Within her womb ; which, for enlargement striving,*

*Shakes the old beldame earth, and topples down*

*Steeplees and moss-grown towers.*

—HENRY IV. ; SHAKESPEARE.

*Earth one time put on a frolic mood,*

*Heaved the Rocks, and changed the mighty motion*

*Of the deep, strong currents of the ocean,*

*Moved this plain, and shook the haughty wood,*

*Crushed the little fern in soft, moist clay,*

*Covered it and had it safe away.*

—*The Petrified Fern.*

1750, March 8.—Earthquake at London.

1902, May 8.—Mt. Pelee eruption, and destruction of St. Pierre, Island of Martinique.

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MEMORANDA AND DIARY.

## MARCH 28.

PETER ANDREAS HANSEN.

b. December 8, 1795.

d. March 28, 1874.

German astronomer, whose plan had for its object the formation of tables; to avoid series which slowly converge, he inserted numerical values throughout. In Hansen's solution the problem is one actually presented by nature, allowance being made for every known cause of disturbance. He wrote on the Mutual Perturbation of Jupiter and Saturn (1831); a treatise on "The Moon's Orbit" (1838); and on the higher mathematics.

*Give me the ways of wand'ring stars to know  
The depths of heav'n above and earth below;  
Teach me the various labors of the Moon,  
And whence proceed the Eclipses of the Sun.*

—Georg. II.: VIRGIL.

If this view of the true tendency of science were practically acted upon, then would every new observation in natural science add a page to that great didactic poem, and every addition to the philosophy of physical science swell the majestic march of that grand epic; the visible creation brought into bolder relief by closer observation would become the well-spring of a poetry rich in the elements of the beautiful, and the more recondite truths of science in the material of that higher poetry which has the sublime for its basis. A new source of poetic feeling will, in the meantime, be opened out of the ever-growing appreciation of the power which has endowed the human mind with faculties capable of penetrating so many mysteries, and adapting the inexhaustible materials and most potent forces of creation to the growing wants and multifarious purposes of mankind.

SANZIO RAPHAEL.

b. March 28, 1483.

d. April 6, 1520.

The first of painters and a skilful architect. In 1515 he was appointed chief architect of St. Peter's Church, but his design was not executed. He designed the Pandolfini Palace at Florence. He excelled in composition, invention and design.

*Raphael is not dead;  
He doth but sleep; for how can he be dead,  
Who lives immortal in the hearts of men?  
He only drank the precious wine of youth,  
The outbreak of the grapes, before the vintage  
Was trodden to bitterness by the feet of men.  
The gods have given him sleep.*

—Michael Angelo: LONGFELLOW.

*Around the mighty master came  
The marvels which his pencil wrought,  
Those miracles of power whose fame  
Is wide as human thought.*

*There drooped thy more than mortal face,  
O mother, beautiful and mild!  
Enfolding in one dear embrace  
Thy Saviour and thy Child!*

—Raphael.

306.—The original St. Peter's Church was erected in Rome by Constantine.

1506.—The first stone was laid in the erection of St. Peter's Cathedral, Rome. In 1514, Raphael was appointed architect and in 1547, Michael Angelo was made architect.

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MEMORANDA AND DIARY.

## MARCH 29.

ELIHU THOMSON.

b. *March 29, 1853.*

d.

American electrician. He was a close student of electricity and devoted himself to inventing, and nearly two hundred patents relating to arc and incandescent lighting, motor work, induction systems, and similar applications, resulted. For the development of these inventions the Thomson-Houston Electric Company was organized. He also invented a system of electric welding, which became an established industry with the machines he invented to utilize the process.

*The machines that are first invented to perform any particular movement are always the most complete, and succeeding artists generally discover that with fewer wheels, with fewer principles of motion than had originally been employed, the same effects may be more easily produced. The first philosophical systems, in the same manner, are always the most complex, and a particular connecting chain, or principle, is generally thought necessary to unite every two seemingly disjointed appearances; but it often happens that one great connecting principle is afterwards found to be sufficient to bind together all the discordant phenomena that occur in a whole species of things.*

—ADAM SMITH.

1875, October.—Paris. Paul Jablchkoff's invention of an electric candle was reported to the academy of science by M. Denavrouse.

1875.—Charles Brush of Cleveland, Ohio, invented a successful dynamo and arc-light.

THOMAS HARRISON.

1744.

d. *March 29, 1829.*

English architect; studied at Rome. Among his works are the bridge at Lancaster; the bridge, gaol, and country courts at Chester; the column at Shrewsbury, in honor of Lord Hill; and a light-house on the coast of the Black Sea. He was the first projector of the grand quay from Westminster Bridge and Blackfriars.

*Creeps on,*

*Barge-laden, to three arches of a bridge*

*Crowned with the minster towers.*

—*The Gardener's Daughter*: TENNYSON.

*Many sealed doors of Nature's fair pavilions*

*Its cunning key of Science did unlock;*

*Silver and gold it digged by tons and millions,*

*And bridged the straits and blasted ridge and rock;*

*And made a playground of God's seas; and filled*

*Deserts with cities and the waste fields filled.*

—XIX. Century: EDWIN ARNOLD.

*A cause that is well supported by solid arguments may be compared to an arch that is well built; nothing can be taken away without endangering the whole.*

—CHARLES CALEB COLTON.

1011-978 B. C.—Jerusalem. David's "House of Cedar" was built by mechanics sent from Tyre.

600-500 B. C.—The Temple of Minerva at Syracuse was erected. Also the temple at Paestum, the Temple of Concord, and of Juno at Agriguntum.

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MEMORANDA AND DIARY.

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## MARCH 30.

JOHN CRESSON TRAUTWINE.

b. *March* 30, 1810. d. *September* 14, 1883.

American civil engineer. He assisted Mr. W. Strickland in the construction of the United States Mint and other Philadelphia buildings, and was engineer of several railroads. In 1844-1849 he was associated with George M. Totten in the construction of the Canal del Dique, connecting the Magdalena River with the Bay of Carthagena, and again with him in 1850 when he made the surveys for the Panama Railroad. He examined and reported on the Harbor of Montreal in 1858, and arranged a system of docks for that city. After 1864 he retired from the practice of his profession, although continuing his consulting work, and acted as an expert on questions of engineering. His works include "Civil Engineer's Pocket-book" (1872).

*They died, devoted, but undying;  
The very gale their names seemed sighing;  
The waters murmured of their name;  
The woods were peopled with their fame;  
The silent pillar, lone and gray,  
Claimed kindred with their silent clay;  
Their spirits wrapped the dusty mountain,  
Their memory sparkled o'er the fountain;  
The meanest rill, the mightiest river,  
Rolled mingled with their fame forever.*

—BYRON.

1855. — Railway between Panama and Colon completed.

SAMUEL ABBOT.

b. *March* 30, 1786. d. *January* 2, 1839.

Harvard, 1808.

American inventor; studied law; inventor of a process by which starch is made from the potato. He was burned to death in his factory.

*The plowman whistles blithely as he goes  
And turns upon the world no coward face,  
In joy he reaps that which in hope he sows,  
Nor bows his head to aught but Heaven's grace.*

*The craftsman, too, rejoices in the thing  
To fashion which his cunning hand was taught;  
Of want he feels nor fears the bitter sting,  
In manhood's strength his destiny is wrought.  
—The Incapable: HAMILTON SCHUYLER.*

*Remember now and always that life is no idle  
dream, but a solemn reality, based upon eternity,  
and encompassed by eternity. Find out your task;  
stand to it; the night cometh when no man can  
work.*

1851. — Spaniards discovered the potato in Peru.

1855. — Potatoes are said to have been brought to England from Santa Fe, New Mexico, by Sir John Hawkins. (1596. — Also by Sir Francis Drake.)

1707. — Samuel Newton and others obtained patents for obtaining starch from potatoes.



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MEMORANDA AND DIARY.

## MARCH 31

JOHN HARRISON.

b. *March* 31, 1693. d. *March* 24, 1776.

English inventor of the chronometer for ascertaining longitude. His fourth timekeeper was in the form of a pocket watch and was finished in 1759. He made many improvements in clocks, among them his recoil escapement, which obviated the necessity of keeping the pallets well oiled. He was the first to employ the "going ratchet," or secondary spring, an arrangement for keeping the timepiece going at its usual rate while being wound up. He constructed a new musical scale or mechanical division of the octave, according to the proportion which the radius and the diameter of a circle have respectively to the circumference.

*They be the secret springs*

*That make our minutes flee.*

*On wheels more swift than eagles' wings:*

*Our life's a clock, and every gasp a breath.*

*Breathes forth a warning grief, till time shall strike with death.*

*They end when scarce begun;*

*And, ere we apprehend*

*That we begin to live, our life is done.*

*Man, count thy days, and if they fly too fast*

*For thy dull thoughts to count, count every day thy last.*

—*The Brevity of Human Life*: QUARLES.

PIERRE LOUIS ANTOINE CORDIER.

b. *March* 31, 1777. d. *March* 1861.

French geologist and mineralogist. As engineer, he accompanied the expedition to Egypt in 1798. In 1819 he was Professor of Geology in the Museum of Natural History at Paris. He was made a peer in 1840. He published an "Essay on the Internal Temperature of the Earth" (1827).

*Every rock in the desert, every boulder on the plain, every pebble by the brookside, every grain of sand on the seashore, is replete with lessons of wisdom to the mind that is fitted to receive and comprehend their sublime import. The very ground on which we tread, and the mountains which surround us, may be regarded as vast tumuli, in which the organic remains of a former world are enshrined.*

—PARKINSON.

60 B. C.—24 A. D.—Strabo discoursed on earthquakes and volcanoes.

1678.—E. Syria. Englishmen discovered the magnificent ruins of Palmyra.

1853, August.—The site of a Roman circus of great size was discovered at Tours.

1836.—General di Cesnola, the American consul, discovered many ancient ornaments in Cyprus.

1890, January 10.—The tomb of Cleopatra was discovered.

1894, June 16.—The tomb of a princess was discovered, which yielded many treasures of ancient jewelry.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

HUGO VON MOHL.

- b. 1805. d. April 1, 1872.
- German naturalist. Professor of botany in the university of Fribingen. In his studies of the vegetable cell he was impressed with its contents. He observed within the cell an opaque viscid fluid having granules intermingled in it, actively in motion, its parts separated into filamentous streams. In 1846 he called this universal substance "protoplasm."

'Tis bad reversion to the type

Of ancient brutelike man,  
Before the centuries spun out the web,  
With toil, and wars, and strenuous deeds,  
That makes the brain of man to-day  
That gives him mastery over all.  
For all the good man does and is,  
Baw down thy head if bow thou wilt—to man,  
For from the hand whence he first came  
Naught perfect ever came from earth.  
A cell, a form, a breath of air, a hope,  
A never-ending struggle after light,  
Since day first dawned has been the fate of man.  
—S. S. J.

Through rivers of veins on the nameless quest  
The tide of my life goes hurriedly sweeping,  
Till it reaches that curious wheel of the breast,  
The human heart, which is never at rest.  
Faster, faster, it cries, and leaping,  
Plunging, dashing, speeding away,  
The wheel and the river work night and day.  
—ELLA WHEELER WILCOX.

WILLIAM HARVEY.

- b. April 1, 1578. d. June 3, 1657.
- Cambridge and Podua, M. D., 1602.
- English physician; discoverer of the circulation of the blood. His discovery is one of the greatest in physiology, and the honor is all his own. He perfected the method of researches upon experimental investigations, which was introduced by Galen and carried on by Hunter. Harvey demonstrated the circulation of the blood in his treatise "Exercitatio de Motu Cordis et Sanguinis," 1628.

*The blood, the fountain whence the spirits flow,  
The generous stream that waters every part  
And motion, vigor and warm life conveys  
To every particle that moves or lives,  
Poured by the heart, and to the heart again  
Refunded.*  
—ARMSTRONG.

- 170.—Galen, an eminent surgeon, flourished.  
1000.—Avicenna, the physician and scholar, flourished (the most learned man of his time).  
1553.—Michael Servetus made public the discovery of the circulation of the blood through the lungs.  
1603.—Fabricio discovered valves in veins.  
1619.—William Harvey made the positive discovery of the circulation of the blood, and announced it to his students. It furnished an entirely new system of physiological and pathological speculation.  
1690.—Leuwenhoeck discovered the connection of the veins and arteries.

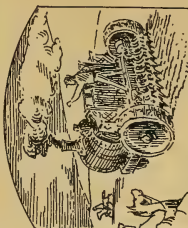


511

Joyous, the impatient husbandman perceived  
 Reluctant nature, and his lusty steers  
 Drives from their stalls to where the well-used plough  
 Lies in the furrow, loosened from the frost.  
 There, unrefusing, to the harnessed yoke  
 They lend their shoulder, and begin their toil.  
 Chtered by the simple song and soaring lark.  
 Meanwhile, incumbent o'er the shining share  
 The master leans, removes the obstructing day,  
 Winds the whole work, and stidelong lays the globe.



OXEN  
 PLOUGH  
 FIFTY ACRES PER DAY



STEAM GANG PLOUGH  
 SIXTY ACRES PER DAY



1904.

FRIDAY.

1904.

MEMORANDA AND DIARY.

## APRIL 2.

FREDERIC AUGUSTE BARTHOLDI.

b. *April 2, 1834.*

d.

French sculptor. His statue of "Lafayette Arriving in America" was executed in 1872, and in 1876 was placed in Union Square, New York. "Liberty Enlightening the World," the colossal statue on Bedlow's Island, in New York Harbor, is his work. On July 4, 1880, this statue was formally delivered to the American minister in Paris, the event being celebrated by a great banquet. In October, 1886, the structure was presented to the nation as the joint gift of the French and American people. The "Lion of Belfort," "Gribeauval," and many other statues were his handiwork.

*When through dead stone to breathe a soul of light,  
With the dull matter to unite  
The kindling genius, some great sculptor glows;  
Behold him straining, every nerve intent—  
Behold how, o'er the subject element,  
The stateliest thought its march, laborious goes!  
For never, save to toil untiring, spoke  
The unwitting truth from her mysterious well—  
The statue only to the chisel's stroke  
Wakes from its marble cell.*

—*The Fairest Apparition*: SCHILLER.

1492-1498.—Andrea Del Verrochio lived. 1466.—He discovered the method of taking likenesses by the use of plaster of paris.

1886.—A great discovery of statuary was made near the Acropolis, Athens.

MARIA SIBYLLA MERIAN.

b. *April 2, 1647.*

d. *January 13, 1717.*

Swiss flower-painter and naturalist. Celebrated for her knowledge of, and paintings in, natural history. She made a scientific tour in South America in 1698 and published "On the Metamorphoses of Surinam Insects" (1705) and a treatise "On the Origin of Caterpillars, their Nourishment and Changes."

*Whoever looks at the insect world, at flies, aphides, gnats, and innumerable parasites, and even at the infant mammals, must have remarked the extreme content they take in suction, which constitutes the main business of life. If we go into a library or news-room, we see the same function on a higher plan, performed with like ardor, with equal impatience of interruption, indicating the sweetness of the act. In the highest civilization the book is still the highest delight.*

—*Quotation and Originality*: EMERSON.

*Born with the spring and dying with the rose,  
To swim on zephyr's wing amid the pure ether,  
To hover o'er the bosom of scarce-opened flowers,  
To drink deep of perfume, of light and of azure;  
While still young to shake the dust from its wings,  
And fly like a breath to the eternal skies,  
Such is the enchanted life of the butterfly.*

—*LAMARTINE*.

1769-1859.—Alexander von Humboldt lived.

1809-1882.—Charles Robert Darwin lived.

1825-1895.—Thomas Henry Huxley lived.



1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

# APRIL 3.

ERASTUS BRIGHAM BIGELOW.

b. April 2, 1814.

d. December 6, 1879.

American inventor; made a hand-loom for suspender-webbing, and a machine for making piping-cord. In 1838 he patented an automatic loom for weaving counterpanes, and also a loom for weaving coach-lace and a power-loom for weaving Brussels tapestry and velvet tapestry carpets. He also wrote a short manual on "Stenography."

*Each human life is warp and woof.*

*Woven of many a thread—*

*Threads of silver and threads of gold,*

*Threads freshly spun and threads grown old,*

*Newly born hopes and hopes long dead,*

*Woven of many a thread.*

—GEORGE F. SEYMOUR.

*For life is one, and in its warp and woof  
There runs a thread of gold that glitters fair,  
And sometimes in the pattern shows most sweet,  
When there are sadder colors. It is true  
That we have wept. But O! this thread of gold  
We would not have it tarnish, let us turn  
Of it and look back upon the wondrous web,  
And when it shineth sometimes, we shall know  
That memory is in possession.*

—Memory; JEAN INGELOW.

1580.—Cambrics were first worn.

1576.—The weaver's or Dutch loom was brought to London from Holland.

1723.—Muslin made in Dresden.

1833.—Damaak table linen was made at Pittsburg.

EDWARD SOMERSET, MARQUIS OF WORCESTER.

b.

1601.

d. April 3, 1667.

English inventor of the first steam engine, in 1655 or 1663. He suggested the first idea of the steam engine, and he hinted at the telegraph, the torpedo and the velocipede. His time was mainly devoted to mechanical studies and experiments and prophecies.

*They build our old world over, anew its mold is wrought,  
They shape the plastic planet to models of their thought.  
This is the iron music whose strains are borne afar;  
The hammers of the world-smiths are beating out a star.*

—The World-Smiths; SAM WALTER FOSS.

*How great, in the wild whirl of time's pursuits  
To stop, and pause, invol'd in high presage,  
Through the long vista of a thousand years,  
To stand contemplating our distant selves,  
As in a magnifying mirror seen,  
Enlarg'd, ennobled, elevate, divine;  
To prophesy our own futures!*

—Night Thoughts; YOUNG.

*Every man is not so much a workman in the world as he is a suggestion of that he should be.  
Men walk as prophecies of the next age.*

—Circles; EMERSON.

1240 B. C.—Daedalus of Athens invented the axe, wedge and lever, also masts and sails for ships.

420 B. C.—The vice, trolley and other instruments were invented by Archytas of Tarentum. The invention is also claimed for Archimedes, 287-212.

1904.

SUNDAY.

1904.

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MEMORANDA AND DIARY.

# APRIL 4.

JOHN NAPIER.

- b. 1550. *d. April 4, 1617.* Scottish inventor of logarithms. He invented an hydraulic screw and revolving axle by which the water in coal pits could be removed. He also invented two varieties of burning mirrors; a piece of artillery; and a chariot of metal (bullet proof), the motion of which was controlled by persons within, and from which shot was discharged through small holes. His permanent fame rests on his mathematical discoveries. He spent much time in developing the theory of logarithms, in perfecting the method of their construction, and in computing the table itself. While thus engaged he invented the present notation of decimal fractions.

*Farewell, O day misspent! Thy fleeting hours were lent  
In vain to my endeavor. In shade and sun thy race is run  
Forever! oh, forever!*

*The leaf drops from the tree, the sand falls in the glass,  
And to the dread Eternity the dying minutes pass.*

— *The Lost Day* : CHARLES MACKAY.

*The great make us feel, first of all, the indifference of circumstances. They call into activity the higher perceptions, and subdue the low habits of comfort and luxury; but the higher perceptions find their objects everywhere; only the low habits need palaces and banquet.*

428 B. C. — Democritus taught that the Milky Way consists of a profusion of stars.

BENJAMIN PEIRCE.

- b. *April 4, 1809.* *d. October 6, 1880.*  
Harvard, 1829.

American mathematician. He planned the measurement of the 39° of parallel to join the Atlantic and Pacific system of triangulation and to determine geographical positions. His mathematical work includes a laborious and exact calculation of the occultations of the Pleiades, furnishing an accurate means of studying the form of the earth and her satellite. His criterion for rejecting doubtful observations is ingenious and a valuable extension of the law of probabilities; and his detection of the mental error of personal preferences for individual digits is a specimen of his acute observation. His books include "Elementary Treatise on Sound" (1836); and "Ideality in the Physical Sciences" (Boston, 1881).

*Through voids unknown to worlds unseen  
His clearer vision rose serene.  
How vast the workroom where he brought  
The vestureless implements of thought!  
The wit how subtle, how profound,  
That Nature's tangled webs unwind;  
That through the clouded matrix saw  
The crystal planes of shaping law,  
Through these the sovereign skill that planned,—  
The Father's care, the Master's hand.*  
— Benjamin Peirce; HOLMES.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

## APRIL 5.

FELIX DUJARDIN.

*b. April 5, 1801.*

French naturalist, well versed in geology, botany and zoology. He became professor of mineralogy at Toulouse in 1839. With others he found that the vegetable or animal cell was filled with a viscid, slimy fluid, capable of motion. To this name he gave the name of "sarcode." He wrote "Natural History of Infusoria" (1841) and "Manual of the Observer with the Microscope" (1843).

*I have gone the whole round of creation; I saw and I spoke;  
I, a work of God's hand, for that purpose, received in my brain  
And pronounced on the rest of his handiwork,—returned him  
again  
His creation's approval or censure; I spoke as I saw.  
I report as a man may of God's work—all's love, yet all's law.*  
—BROWNING.

*Geology, a science of forty or fifty summers, has had the effect to throw an air of novelty and mushroom speed over entire history. The oldest empires—what we called venerable antiquity—now that we have true measures of duration, show like creations of yesterday.*

—Progress of Culture: EMERSON.

1530.—Saxony. The first mineral system was laid down by George Agricola.

1677.—Antoine van Leuwenhoeck discovered spermatic animalcules.

1838.—Von Baer's law of embryological development appeared.

THEODORE RUGGLES TIMBY.

*b. April 5, 1822.*

*d.*

American inventor; claims the invention of the turret used on the Monitor in the Civil War, 1861–1864. In 1844 he invented the American turbine water-wheel; in 1861 he devised a method, now in universal use, of firing heavy guns by electricity. Among the elaborations and developments of the original idea of the revolving tower, which he has perfected from time to time, are the cordon of revolving towers across a channel (1861); the planetary system of towers (1880); the subterranean system of defense (1881); and the revolving tower and shield system (1884).

*Let others write of those who fought  
On many a bloody field—  
Of those, whose daring deeds were wrought  
With sword, and spear, and shield;  
But I will write of the brave,  
The bravest of the brave,  
Who fought for neither fame nor gold—  
Who fill an unmarked grave!*

—The Heroes of Industry: G. P. R.

*The honest projector is he who, having by fair and plain principles of sense, honesty, and integrity, brought any contrivance to a suitable perfection, makes out what he pretends to, picks nobody's pocket, puts his project in execution, and contents himself with the real produce as the profit of his invention.*

—DE FOX.

1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

## APRIL 6.

ZENOBE THEOPHILE GRAMME.

b. April 6, 1826.

d. February 3, 1901.

Belgian cabinetmaker and inventor. With no education, he went to Paris and Berlin to study physics. In 1865 he established a laboratory in Paris and began original investigation; in 1867 he patented an alternating current machine and in 1869 he constructed the first hand magnetic dynamo. He became so poor that he pawned his furniture to pay the expense of securing patents. In 1872 he patented the original of the present dynamo, which has made possible the recent advancement of electricity in the arts and industries, in lighting and in transportation.

*Crowned with the culture of the centuries,  
With honest mien and noble, manly pride,  
He gazes fearless back across the past.  
Triumphant o'er the forces of the world.  
Fired by wisdom's sacred heritage,  
Imbued with ardent trust and sanguine hope,  
Strong driver of Progression's potent plow,  
He presses onward certain of success—  
Upon his brow serene intelligence  
Reigns sovereign consort of integrity.*

—The Maker's Image: ALBERT C. ANDREWS.

1787, March 16.—1854, July 7, Georg Simon Ohm lived. He discovered the laws of electric currents and published "Die Galvanische Kette Mathematische Bearbeitet" (1827).

1831.—Faraday discovered that an electric magnetic rotative force is developed in a magnet by voltaic electricity. He discovered the induction of electric currents.

JAMES ALFORD HOUSE.

b. April 6, 1838.

d.

American inventor and mechanical engineer, of the Wheeler & Wilson Man'g Company. He invented several sewing-machine improvements, among them a button-hole machine and a button-hole attachment for the Company's sewing-machine, in 1866, and an ingenious adaptation of the variable motion by means of a steel pin moving over unequal distances in equal time in a slotted disk.

*Oh! men, with sisters dear!  
Oh! men, with mothers and wives!  
It is not linen you're wearing out,  
But human creatures' lives!  
Stitch—stitch—stitch—  
In poverty, hunger, and dirt,  
Sewing at once, with a double thread,  
A shroud as well as a shirt.*

—The Song of the Shirt: THOMAS HOOD.

1365.—Pins were invented at Nuremberg, Bavaria. 1370—needlemakers were there incorporated, and their sales were rapidly extended. A negro, Cheapside, first made fine needles in England, and he kept his secret; but in 1566 Elias Grouse, a German, made known the process.

1814.—A sewing-machine was made by Madersberger, at Vienna.

1818.—Adams & Dodge invented a sewing-machine.

1834.—A sewing-machine was invented by Thimonnier.

1846, Sept. 10.—Elias Howe received a patent for the first complete and practicable sewing-machine.



1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

# APRIL 7.

WILLIAM STRICKLAND.

b. 1787.

d. April 7, 1854.  
American architect. He designed and built the old Masonic Hall, Philadelphia, opened December 27, 1810; the United States Bank, modelled after the Parthenon at Athens, finished in August, 1824; the new Chestnut Street Theatre, the Arch Street Theatre, the U. S. Custom House, the U. S. Mint and the U. S. Naval Asylum, the Merchants' Exchange and St. Stephen's Episcopal Church, all in Philadelphia, and the Delaware breakwater. His last work was the State House at Nashville, Tenn., during the construction of which he died.

*The heroes of the plow and loom,  
The anvil and the forge;  
The delvers down amid the gloom  
Of yonder rocky gorge;  
Heroes who built yon lofty tower,  
And forged its heavy bell,  
Which faithfully proclaims the hour,  
And marks its flight so well.*

—Heroes of Industry; G. P. R.

*For the structure that we raise,  
Time is with materials filled;  
Our to-days and yesterday  
Are the blocks with which we build.  
Build to-day, then, strong and sure,  
With a firm and ample base;  
And ascending and secure  
Shall to-morrow find its place.*

—The Builders; LONGFELLOW.

HENRY BELL.

b. April 7, 1767.

d. November 14, 1830.  
Scotch engineer. He built the first regular passenger steamer of Scotland (1812) which ran on the Clyde. He was the originator of steam navigation in Europe, and in America he was preceded only by Fulton. He is credited with the invention of an important improvement in calico printing, the "discharging machine."

*The white man came and felled the mighty tree,  
As timber for a ship;  
The noble vessel built, 'twas joy to see  
The swan-like thing of beauty plow the sea,  
Bound on an eastern trip.*

*Full half-way round the globe, it met a gale—  
Fierce was its sudden sweep.  
The arrow-wounded plank was first to fail,  
And men and treasures, 'mid the storm's wild wail,  
Sunk in the dismal deep!*

*Thus each effect hangs on its distant cause—  
How joined we may not see;  
But great events unfold by hidden laws;  
And he who on a deer his arrow draws,  
May sink a ship at sea!*

—Great Effects from Little Causes: HENRY HARRAUGH.

1801.—First successful experiment on the Thames with a steamboat.

1803, August 9.—Robert Fulton's steamboat, *Claremont*, sailed on the Seine, Paris.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

# APRIL 8.

ROBERT BARKER.

- b. 1739. *d. April 8, 1806.*  
English portrait painter, of Edinburgh; the reputed inventor of panoramas.

*In framing artists, art hath thus decreed,  
To make some good, but others to exceed.*

—PERCIES: SHAKESPEARE.

*Oh! sovereign Masters of the Pencil's might,  
Its depth of shadow, and its blaze of light,  
Ye, whose bold thought, disdaining every bound,  
Explored the worlds above, below, around.*

—MRS. HEMANS.

*And, as it hovered o'er with parting ray,  
Ye seized the shades so neighborly,  
With silent hand, with feeling mind,  
And taught how they might be combined  
In one firm bond of harmony.*

—The Artists: SCHILLER.

- 1400 B. C.—Cleanthes, of Corinth, invented painting. (?)  
335 B. C. (about).—Encaustic paintings were invented by Gasias.

1402.—Oil was first used in painting by Jan Van Eyck.

1473.—Antonello da Messina, of Venice, introduced the use of oil for painting in Italy.

1788.—A panorama giving a bird's eye view, painted on the wall of a circular building, was exhibited in-Edinburgh; it was the first of the kind.

1823.—The diorama was invented by Louis Jacques Mande Daguerre and Bouton.

1838.—Manufacture of varnish for commercial use commenced.

DAVID RITTENHOUSE.

- b. April 8, 1732. *d. June 26, 1796.*  
American astronomer, who invented the orrery; also a thermometer whose action depended upon the expansion and contraction of two metals. He constructed an orrery on a new and more perfect plan than had ever before been attempted, and it was finished in 1770.

*The journeying atoms, primoidal wholes  
Firmly drawn, firmly driven by their animate poles.*  
—EMERSON.

*In fields of air he writes his name,  
And treads the chambers of the sky,  
He reads the stars, and grasps the flame  
That quivers round the throne on high.  
In war renown'd, in peace sublime,  
He moves in greatness and in grace;  
His power, subduing space and time,  
Links realm to realm, and race to race.*

—CHARLES SPRAGUE.

450 B. C.—Anaxagoras noted the nature of the sun and moon eclipses and the movements of the planets.

368 B. C.—A celestial globe was introduced from Egypt.

360 B. C.—Eudoxus discoursed on the movements of the planets.

357 B. C.—Aristotle discoursed on the occultation of Mars and asserted that the earth was round.

1546-1601.—Tycho Brahe's astronomical drawings were published.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## APRIL 9.

CHARLES EUGENE DELAUNAY.

b. April 9, 1816.

d. August 5, 1872.

French mathematician and astronomer. Wrote several valuable works on astronomy and mechanics. Among his works are "Cours Elementaire d'Astronomie", and "Traite de Mechanique." He was appointed Engineer of Mines and Professor of Mechanics, in the Polytechnic School.

*Pen, I say, so purely golden,  
For the which I'm much beholden  
To the eye, in dust that found it;  
To the mill, from quartz that ground it;  
To the spade, from earth that dug it;  
To the hand that clutched the nugget  
That had lain for countless ages.*  
—A Poet's Pen: J. P.

*What! old friend, and art thou freed  
From the bondage of the pen?  
Free from care and toil, indeed?  
When to wander among men  
When and howsoever thou wilt?  
All thy drops of labor spilt  
On those huge and figured pages,  
Which will sleep unclasped for ages,  
Little knowing who did wield  
The quill that traversed their white field?*

—An Epistle to Charles Lamb: HARRY CORNWALL.

1803.—Steel pens were invented by Mr. Wise.  
1830.—Steel pens were manufactured.  
1840.—Gold pens manufactured in New York.

ABRAHAM GESNER.

b. May 2, 1797.

d. April 9, 1864.

Canadian geologist. He was early identified with the development of illuminants from hydrocarbons. In 1851 he obtained from Trinidad asphalt an illuminating oil; subsequently he distilled an oil suitable for lamps, from cannel coal and bituminous shale, thus originating in America the discovery of "kerosene," the name which he gave to it. He published "The Geology and Mineralogy of Nova Scotia" (1837); "Industrial Resources of Nova Scotia" (1849); "A Practical Treatise on Coal Petroleum and other Distilled Oils" (1861).

*Tell me, lump of carbon, burning  
Lurid in the glowing grate,  
While thy flames rise twisting, turning,  
Quench in me this curious yearning;  
Ages past elucitate.*

*Tell me of the time when, waving  
High above the primal world,  
Thou wast a giant palm-tree, lifting  
Thy proud head above the shifting  
Of the storm-cloud's lightning hurled,  
While the tropic sea, hot laving,  
Round thy roots its billows curled.*

—Chambers' Journal.

1828.—Burning oil was first used for lighting purposes.  
1839, April 6.—Petroleum was discovered at Kingsville, Ontario.  
1890, July 31.—Natural gas was struck at Kingston, Ontario.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

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# APRIL 10.

JOHN WHITEHURST.

b. April 10, 1713.

d. February 18, 1788.

American-English engineer and mechanic; was a watchmaker in his father's business at Derby, and became celebrated for constructing philosophical instruments and hydraulic machines, including an engine for raising water from a well to the summit of a hill. He wrote "An Inquiry into the Original State and Formation of the Earth," "A Treatise on Chimneys," and a treatise for promoting the health and comfort of society.

*Wind the clock and keep it going,  
Let the key be faith in God;  
Let the works be oiled with patience,  
And let honor be the rod.*

*Though its hands shall show thee early  
That thy time for work is done,  
Mind its pointings; they speak truly;  
Be not blind, or deaf or dumb.  
—Wind the Clock.*

250 B. C.—Ctesibus, an Egyptian barber of Alexandria, is credited with inventing the pump, air-gun, fire-engine, toothed wheels and the hydraulic organ.

1532.—Bavaria. A striking machine ram was invented by Weber at Nuremberg.

1785.—The hydraulic press was invented by Joseph Bramah.

1825.—John Crowther's hydraulic crane was patented.

JOSEPH LOUIS LAGRANGE.

b. January 25, 1736.

d. April 10, 1813.

French mathematician. He made many important discoveries, particularly in calculating the motion of fluids and the theory of vibrations. He took up the nebular hypothesis of Herschel and gave it definite proportions. He wrote "Mécanique Analytique" and "Fonctions Analytiques." His "Mécanique Céleste" is the mathematical monument of the 18th century.

*Man has plumed these veiled realms,  
The boundaries of the possible have been extended.  
A mortal armed with the eye of a giant  
Has been enabled to see gleams of light  
Oscillating on the confines of empty space!*  
—J. J. AMPERE.

*The mind, indeed, enlightened from above,  
Views him in all, ascribed to the grand cause  
The grand effect, acknowledges with joy  
His manner, and with rapture tastes his style;  
But never yet did philosophic tube,  
That brings the planets home into the eye  
Of observation, and discovers, else  
Not visible, his family of worlds,  
Discover Him that rules them.*

2095 B. C.—The science of geometry was cultivated.

222-205 B. C.—Appollonius Pergæus wrote on Conic Sections in eight books, and other geometrical works.

200-100 B. C.—Hypsicles made researches in polygonal numbers and arithmetical progression.



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MEMORANDA AND DIARY.

## APRIL 11.

RALPH DODD.

b. 1756 or 1760.

d. April 11, 1822.

English civil engineer. The projector of the Vauxhall Bridge, the South Lambert Waterworks, the Gravesend Tunnel, the Surrey Canal, and many other public works. He wrote an "Account of the Principal Canals"; "Letters on the Improvement of the Port of London," and "Observations on Water." He was the father of George Dodd.

*"Mountains old as the Creation I have permitted to be bored through; bituminous fuel-stores, the wreck of forests that were green a million years ago, I have opened them from my secret rock-chambers, and they are yours. Yours huge fleets, steamships, do sail the sea; huge Indias do obey you; from huge New Englands and Antipodal Australias, comes profit and traffic to this Old England of mine!" So answers Nature. The Practical Labor of England is not a chimerical Triviality; it is a Fact, acknowledged by all the Worlds; which no man and no demon will contradict. It is, very audibly, though very inarticulately as yet, the one God's Voice we have heard in these two athletic centuries.*

—Past and Present; CARLYLE.

546 B. C.—Nitrocris died. She was Queen of Babylon, and built a bridge across the Euphrates, paved the river with brick, lined it with huge walls and dug reservoirs for the superfluous waters of the river.

115.—Trajan built a bridge across the Danube, 4,770 feet long. Appollodoros was the engineer. He also constructed Trajan's forum, and many other great structures.

ROSS WINANS.

b. October , 1796.

d. April 11, 1877.

American inventor, who began life as a farmer. His inventions include a plough, the friction-wheel for cars, and the outside bearing on car-axles; also the eight-wheeled truck system. He built the first successful locomotive used on the Baltimore & Ohio Railroad and invented the camel-back locomotive. He established the largest railway machine shops in the country and his sons were associated in their management.

*A song to the plow, the brave old plow,  
That hath ruled the wide world o'er,  
For life and good fare on his strong steel share  
Shall depend for evermore;  
There is strength in his beam, as the toiling team  
Turns the furrow so long and deep,  
While it mellowes the sod, we have trust in God  
That His promise He will surely keep.  
Then a health to the plow, to the brave old plow,  
Who hath fed all the nations gone;  
And glory is now to the brave old plow  
When a thousand years have flown.*

—The Brave Old Plow.

*The great inventor is one who has walked forth upon the industrial world, not from universities, but from hovel; not as clad in silks and decked with honors, but as clad in fustian and grimed with soot and oil.*

—ISAAC TAYLOR.

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MEMORANDA AND DIARY.

THOMAS SILVER.

b. June 17, 1813.

American inventor. Patented a grain-dryer, a fuel-saving heat chamber, a gas consumer, a tension regulator, a machine for paying out submarine cables, a machinery lubricator, a rotary ascending railway, and clockwork for mechanical lamps. His best known invention is his "marine governor." He published "A Trip to the North Pole, or the Theory of the Origin of Icebergs" (1887).

*What are we set on earth for ? Say, to toil—  
Nor seek to leave thy tending of the vines  
For all the heat o' day, till it declines,  
And Death's mild curfew shall Work assail,  
God did anoint thee with his odorous oil,  
To wrestle, not to reign; and He assigns  
All thy tears over, like pure crystallines,  
For younger fellow-workers of the soil  
To wear for amulets.*

—Cease not to Labor : ELIZABETH B. BROWNING.

1737.—Dr. Clayton made experiments to prove that coal contained gas, like the "fire damp" of coal mines, and that it burned with a bright flame. In 1739 he described the effect of the "spirit of coal," obtained by destructive distillation of coal in an iron resort.

1792.—William Murdoch, a Scotchman, lighted his home and office with coal gas, the first practical illustration. In 1798 he lighted the Soho foundry with gas.

1797.—Gas was used extensively for the first time by Murdoch in Watt's engine factory.

ARCHYTAS.

b. about 408 B. C.

d.

Pythagorean philosopher. He was a mathematician, a general and a statesman, and was eminent in each of these pursuits. As a mechanic he invented the screw, the crane, pulley, vise and various hydraulic mechanics. His only extant production is a metaphysical work "On the Universe." He was one of the first who applied geometry to mechanics and framed powerful machines on mathematical principles.

*These roads that yet the Roman hands assert,  
Beyond the weak repair of modern toil ; stream  
These fractured arches, that the chiding immense  
No more delighted hear ; these rich remains  
Of marbles, now unknown, where shines imbedded  
Each parent ray • these massy columns, hewed  
From Afric's farthest shore ; one granite all,  
These obelisks high towering to the sky,  
Mysterious marked with dark Egyptian lore ;  
These endless wonders that this sacred way  
Aluminate still, and consecrate to fame.*

—Liberty : THOMAS.

1461 B. C.—Thothmes III. became "one of the greatest of Egyptian builders and patrons of art." He erected immense obelisks, two of which are 162 feet high, and two others 105 feet high. One of these now stands in Rome before the Church of St. John Lateran ; one of his monoliths, which originally adorned the entrance to the Temple of the Sun at Heliopolis, has been removed to London and another to Central Park, New York.

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MEMORANDA AND DIARY.

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## APRIL 13.

RICHARD TREVITHICK.

b. April 13, 1771.

d. April 22, 1833.

English engineer and inventor. "The Father of the Locomotive Engine." Introduced the high pressure steam engine in 1802. He effected improvements in the plunger pump, an indispensable adjunct to mining; this was later developed by him into a double-acting water-pressure engine. In 1803 he constructed the first steam locomotive ever used upon a railway. This engine was a marked advance upon all previous types, and upon the strength of its performances it has been claimed that Trevithick was the "real inventor of the locomotive."

*Put forth your force, my iron horse, with limbs that never tire;  
The vest of oil shall feed your joints, and the best of coal your fire;  
Like foaming wine it fires my blood to see your lightning speed,—  
Arabia's race ne'er matched your pace, my gallant steam-borne steed!  
My blessing on old Trevithick! let his fame forever last!  
For he was the man who found the plan to make you run so fast;  
His arm was strong, his head was long, he knew not guile nor fear;  
When I think of him, it makes me proud that I am an engineer!  
—The Engine-Driver to His Engine.*

WILLIAM J. MACQUORN RANKINE.

1814.—George Stephenson constructed his first locomotive; it traveled six miles an hour.

HERO OR HERON.

Lived about 284–221 B. C.

Greek mathematician of Alexandria. He gained a reputation by his skill in geometry, mechanics, pneumatics, etc., on which he wrote several treatises. The pneumatic experiment called Hero's fountain, in which a jet of water is maintained by compressed air, gave celebrity to his name. In his writings is mentioned an engine whose motive power was produced by steam; also a double forcing pump used for a fire engine.

*Where are the mighty ones of ages past,  
Who o'er the world their inspiration cast,—  
Whose memories stir our spirits like a blast?  
Where are the dead?*

*O Purpose of the stumbling years,  
O wistful Need and Hope,  
Whereby in all the woven spheres  
The atoms yearn and grope;  
Flow through the wandering will of man  
A tide of slow decay,  
And merge our strivings in the plan  
That draws the world to Thee.*

—FREDERICK LANGLEIDGE.

236 B. C.—The screw cylinder for raising water was invented by Archimedes.

216 B. C.—A water-organ was invented by Archimedes.

212 B. C.—He demonstrated the properties of the lever.

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## APRIL 14.

LEONARD EULER.

b. *April 14, 1707.*

*d. September 7, 1783.*  
French mathematician. In 1749 appeared his great work on the construction and manœuvring of ships. He received a handsome present for his lunar tables.

*To catch dame Fortune's golden smile,  
Assiduous wait upon her,  
And gather gear by every wile,  
That's justified by honour;  
Not for to hide it in a hedge,  
Nor for a train attendant,  
But for the glorious privilege  
Of being independent.*

—BURNS.

*To meditate, to plan, resolve, perform,  
Which in itself is good—as surely brings  
Reward of good, no matter what be done.*

—Course of Time; FOLLOCK.

*Great things through the greatest hazards are achiev'd,  
And then they shine.*

—Local Subject; BRAUMONT & FLETCHER.

595, May 28, B. C.—Thales' prediction of a solar eclipse was fulfilled; it separated the Medes and Persians in a battle on the river Halys, Asia Minor. He taught the true cause of lunar eclipses.

413 B. C.—A total eclipse of the moon was seen at Sardis.

219 B. C.—A total eclipse of the moon was seen in Asia Minor.

120 B. C.—The theory of eclipses was known.

WILLIAM A. BULLOCK.

b. 1813.

*d. April 14, 1867.*

American inventor. He perfected the automatic feeding mechanism that forms an important feature in the presses bearing his name. The Bullock web perfecting press revolutionized the art of press-building; it was invented in 1865 and since then has been developed by R. Hoe & Company.

*The poet is not born, but made—  
Through fire is drawn the noblest song—  
He wields in fight the deadliest blade  
Whose thews, from constant drill, are strong.  
Sigh not for genius; strike and win;  
Battle with Fate for good or ill;  
The gifted sot had better been  
A dullard with an iron will!*

—JAMES MAURICE THOMPSON.

*No great thing is created suddenly, any more  
than a bunch of grapes or a fig. If you tell me that  
you desire a fig, I answer you that there must be  
time. Let it first blossom, then bear fruit, then  
ripen.*

—EPICTETUS.

1823, June.—First steam-power printing-press set up in United States; the first work was an abridgment of Murray's Grammar.

1850.—The durability of stereotypes was greatly increased by electrotyping them with copper; the process was opposed by the journeymen printers.



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## APRIL 15.

SYLVANUS SAWYER.

b. April 15, 1822.

d.

American inventor. When a lad he invented a reed organ embodying many features of those now in use; he invented a machine for preparing cane from rattan, and his inventions have revolutionized that business, bringing it from Southern India, China and Holland to this country. In 1853 he invented improvements in rifled cannon projectiles, which were patented in 1855. These embrace a coating of soft metal on the shell, which prevents "windage" and fills the grooves of the rifling and obviates the use of helical projections; the percussion-cap to insure the explosion of the shell on impact is also included. He took out patents on dividers and calipers in 1867, and a centring-watch-maker's lathe in 1882.

*They are in the loud stunning tide  
Of human care and crime,  
With whom the melodies abide  
Of th' everlasting chime.  
Who carry music in the heart  
Through dusky lane and wrangling mart,  
Plying their daily task with busier feet  
Because their secret souls a holy strain repeat.*

—J. KEEBLE.

1811-1874, March 13.—Christian Sharps lived. He invented the Sharps breech-loading rifle and other firearms of great value and patented many ingenious implements of various kinds.

SAINT-HILAIRE ETIENNE GEOFFROY.

b. April 15, 1772.

d. June 19, 1844.

French naturalist. Favorite pupil of Hany. He accompanied Bonaparte's expedition to Egypt in 1798. His celebrated theory of the unity of organic composition may be said to have laid the foundation of philosophical anatomy. He, with Owen, discovered the great Dinorfs of New Zealand and the Epinoris of Madagascar. He has written "Anatomical Philosophy" (1812-1822); "On the Principle of the Unity of Organic Composition" (1828); and a "Natural History of the Fishes of the Nile and Reptiles of Egypt" (1808-1829).

*The sucking-fish beneath, with secret chains,  
Clung to the keel, the swiftest ship detain.  
The seamen run confused, no labor spared.  
Let fly the sheets and hoist the topmast yard.  
The master bids them give her all the sails  
To court the winds and catch the coming gales.  
But though the canvas bellies to the blast,  
And boisterous winds bear down the cracking mast,  
The bark stands firmly rooted on the sea,  
And will, unmoved, nor winds nor waves obey;  
Still, as when calms have flattened all the plain,  
And infant waves scarce wrinkle on the main.*

—The Remora.

1780, May 5-1851, January 27.—John James Audubon lived. He made a magnificent collection of drawings of birds, which were accidentally destroyed by fire when nearly completed and were repainted at a cost of great labor and time. He wrote the "Ornithological Biographies."

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MEMORANDA AND DIARY.

## APRIL 16.

SIR JOHN FRANKLIN.

*b. April 16, 1786.*

*d.*

1847.

English arctic explorer. In 1819 he commanded an exploring expedition sent to determine the geography of Arctic America and its northern coast. After much fatigue, suffering and disaster the party returned to England in 1822. In 1845 he again sought a waterway from the Atlantic to the Pacific; in July the party was observed at the entrance to Lancaster Sound, and this was the last ever seen of them.

*Pointing to where the Arctic circle keeps*

*Its awful secrets locked in pierceless gloom ;*

*And Franklin, the explorer, in his tomb*

*Of frost, unchangeable forever, sleeps.*

*Pointing to that last, utmost verge, around*

*The pole whereon the solel planet turns,*

*And, all undimmed, the Boreal splendor burns*

*Out of the darkness of that vast profound.*

*Thou extreme North ! What is the force that draws*

*Toward thee alike the needle and this flower ?*

*What is that weird, inexplicable power—*

*Of such mute marvel, what the wondrous cause ?*

*—The Compass Flower : PARK BENJAMIN.*

1497.—John Cabot, of England, discovered Labrador and Newfoundland. He was the first to land on the mainland (of America).

1610.—Hudson Bay was rediscovered by Henry Hudson when in search of a northwest passage to the Pacific Ocean.

1618.—Baffin reached the 78° of latitude in Baffin's Bay.

SIR HANS SLOANE.

*b. April 16, 1660.*

*d. January 11, 1753.*

University of Orange, M. D., 1683.

James Petiver, the English botanist and naturalist, made a fine collection of rare plants, insects, etc. Sir Hans Sloane, an English physician, purchased it and with it founded the British Museum.

*Were public benefactors to be allowed to pass  
away, like hewers of wood and drawers of water,  
without commemoration, genius and enterprise  
would be deprived of their most coveted distinction.*

*—SIR HENRY ENGLEFIELD.*

*Man dies. Unmoved the world goes tranquil on ;*

*Earth back to earth—'tis over soon, and he*

*Meets the great change, yet leaves behind when gone*

*Not e'en a ripple on the living sea.*

*The hand that for a season shook the world,*

*All potent in the great affairs of men,*

*Sinks in the dust ; a gasp, a feather swirled,*

*A breeze gone by—the world forgets again !*

*How weak and fragile is the straining thread*

*That holds a life ! A second—it is gone !*

*How soon may sink the most illustrious head*

*A thousand leagues deep in Oblition !*

*—LOWELL O. REESE.*

1773, August 22.—1858, May, Aime Bonpland lived. In 1799 he accompanied Humboldt on a scientific tour to South America, and on their return in 1815 they published "Travels in the Equinoctial Regions of the New Continent." In 1815 he published "Monograph of the Melastomeæ" and "Equinoctial Plants Collected in Mexico."

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## APRIL 17.

FREDERICK KOENIG.

b. April 17, 1774.

d. January 17, 1893.

German inventor ; made great improvements in the art of printing. In 1802 he contrived an improved press, provided with a movable carriage on which the types were placed, with inking rollers, and a new mechanical method of taking off the impression by flat pressure. This was patented March 29, 1810. The arrangement was similar to that of the platen presses, the printing being produced by two flat plates, as in the common hand-press. He also invented and carried into practical operation the cylinder printing-press for newspapers. A patent was secured October 30, 1811, and the new machine was completed in December, 1812. He invented and constructed a successful steam printing-press, the first of its kind.

*O, where is the man with such simple tools  
O, Can govern the world as I ?*

*With a printing-press, an iron stick,*

*And a little leaden die,*

*With paper of white, and ink of black,*

*I support the Right and the Wrong I attack.*

—*The Printer's Song* : J. C. PIERCE.

1810, April 21.—1878, January 27.—George Phineas Gordon lived. He made improvements in job and treadle presses, and was granted more than fifty patents. His was the "Gordon" press.

W. J. McGEE.

b. April 17, 1853.

d.

American geologist. He was self-educated, and in early life invented and patented several improvements on agricultural implements. Subsequently he turned his attention to geology and made important investigations in that direction, including researches on the loess of the Mississippi valley and the study of a fault movement in the middle Atlantic slope. As geologist of the U. S. Geological Survey he visited in 1886 the City of Charleston for the purpose of studying the earthquake disturbances in its vicinity.

*And in that rock are shapes of shells, and forms  
Of creatures in old worlds, of nameless worms,  
Whose generations lived and died ere man,*

*A worm of other class, to crawl began.*—GRABBE.

*Useless ? Lost ? There came a thoughtful man,*

*Searching Nature's secrets, far and deep ;*

*From a fissure in a rocky steep*

*He withdrew a stone, o'er which there ran*

*Fairy pencillings, a quaint design,*

*Veinings, leafage, fibres clear and fine,*

*And the fern's life lay in every line !*

*So, I think, God hides some souls away,*

*Sweetly to surprise us the last day.*

—*The Petrified Fern.*

1331.—Richard Norwood was the first to measure a degree of the meridian.

1817.—Work was begun by the United States Coast Survey.

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MEMORANDA AND DIARY.

# APRIL 18.

JUSTUS LIEBIG.

b. May 12, 1803.

Bonn, Erlangen and Paris, 1824.

German chemist; introduced new methods in agriculture and pharmacy, in the manufacture of vinegar and glass, and in the preparation of food. His meat extract is now extensively used, as is his Suppe-fur Sangling (baby soup). He is one of the founders of organic chemistry and his researches concerning the application of chemistry to physiology and pathology are invaluable.

*Some hands have art to move the heart,  
By waking music's sweet appeal;  
Some borrow dyes from perfect skies,  
And, through the canvas, make us feel;  
Some make the dress fair forms caress;  
To win the heart and turn the head;  
For me, more rare beyond compare  
Are the bonny hands that make good bread.*

—JOHN S. ATCHESON.

*Whilst the exploits of the conqueror and the intrigues of the demagogue are faithfully preserved through a succession of ages, the persevering and unobtrusive efforts of genius, developing the best blessings of the Deity to man, are often consigned to oblivion.*

—DAVID MUSER.

Vinegar was known nearly as soon as wine. The ancients had several kinds which they used for drink. The harvesters parboiled of this liquid for their refreshment, a custom still prevalent in Spain and Italy.

1650.—Bread was first made with yeast by the English.

d. April 18, 1873.

PETER GRIESS.

1829.

d.

1888.

German chemist. His discovery and investigation of the diazo-compounds led him to the azo-dyes. He was the father of this enormous industry. He showed how the diazo-compounds were formed by the action of nitrous acid on aromatic amido-compounds.

*Thy nature, immortality! who knows?  
And yet who knows it not? It is but life  
In stronger throb of brighter color spun,  
And spun forever; dippl'd by cruel fate  
In Stygian dye, how black, how brittle here!  
How short our correspondence with the sun!  
And while it lasts, inglorious! our best deeds,  
How wanting in their weight! our highest joys  
Small cordials to support us in our path,  
And give us strength to suffer.*

—Night Thoughts: YOUNG.

1861, December 10.—Wladimir Wassiljewitsch Markownikoff and Sawitsch discovered normal allylene.

1888.—Graebe and Lieberman discovered alizarine in the coloring principle of madder.

1868.—Lieberman and Caro discovered acridine in crude anthracene.

1788, Mar. 22-1842, July 19.—Pierre Joseph Pelletier lived. He discovered several vegetable salifiable bases. Caventou and he discovered quinine in 1820. In 1837 Walter and he discovered toluene.



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# APRIL 19.

GUSTAV THEODOR FEELMER.

b. April 19, 1801.

d.

German natural philosopher. Professor of physics at Leipzig in 1834. Acquired distinction by his researches in galvanism. He published a number of works on organic chemistry.

*To invent is to discover that we know not.*

—Advancement of Learning: BACON.

*The labor of invention is often estimated and paid on the same plan as that of execution.*

—J. S. MILL.

*But thinkers keep on thinking. Every successive age contributed something—this a wind-mill, this a pen-knife, this a compass, this a printing-press, this a paper-mill, this a water-pump, this a power-loom, this a locomotive engine, this an ocean telegraph, this a telephone, this an electric light—to the general stock. We are now rejoicing in this accumulated brainwork.*

—Originality: REV. ELIAS NASON.

1792.—Voltaic or chemical electricity was discovered by Alessandro Volta, of Como.

1800.—The Voltaic battery was invented.

1800.—Humphrey Davy produced electric light with carbon points.

1813.—Davy exhibited the voltaic arc.

1858.—First patent for an electric lamp in U. S. was issued to Collier, of Binghamton, and Baker, of New York.

NICHOLAS SAUNDERSONS.

b. 1682.

d. April 19, 1739.

English professor of mathematics, University of Cambridge. When a year old he was deprived of sight by small-pox, his eyeballs being dissolved by abscesses, so that he retained no more distinct ideas of light and colors than if he had been born blind. He studied Greek and Roman and heard the works of Euclid, Archimedes and Diophantus read in the original Greek. The celebrity of his commentaries on the principles of Newton reached the ear of their immortal author. For some years he was afflicted by a torpidness of the limbs which, in 1739, ended in the loss of a foot. He published "Elements of Algebra." A blind man moving in the sphere of a mathematician seems a phenomenon difficult to be accounted for; and he has excited the admiration in every age in which he has appeared.

*My useless eyes are reservoirs of tears,*

*Doomed for their blind mistakes to overflow;*

*Because I could not see—I did not know. Because I*

*These sightless eyes—than angriest glance less kind—*  
*Light of the World, have pity! I am blind.*

—ROBERT J. BURDETTE.

*Science, though despised by the ignorant, is better than bodily strength.*

—WM. J. MACQ. RANKINE.

*Genius is simply intensity of faculty.*

—R. L. DAWSON.

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## APRIL 20.

HENRY BURDEN.

b. *April 20, 1791.*

*d. January 19, 1871.*  
Scotch-American inventor of a threshing machine, and a builder of grist-mills. The first cultivator invented in this country was patented by him in 1820; in 1825 he invented a machine for making wrought-iron spikes; in 1835, for making horse-shoes, and a later and more improved one in 1857; in 1840, one for making the hook-headed spike; and in 1849, a self-acting machine for rolling iron into bars. In 1833 he built a steamboat, the "cigar-boat," and in 1836 he advocated a line of ocean steamers of 18,000 tons burden. In 1845 he visited England to persuade shipowners to adopt the side-wheel, in which he was unsuccessful.

*She builds not on the ground, but in the mind,  
Her open-hearted palaces  
For larger-thoughted men with heaven and earth at ease;  
Her march the fume now marks, the sleepless wheel,  
The golden sheaf, the self-swayed commonweal;  
The happy homesteads hid in orchard trees  
Whose sacrificial smokes through peaceful air  
Rise lost in heaven, the household's silent prayer;  
What architect hath bettered these?*

—LOWELL.

1808. — The first sea voyage ever made by a steam vessel was made by the "Phoenix," a single-screw propeller, under Captain Stevens, from New York to Philadelphia.

1819. — Steamship "Savannah," first trans-Atlantic steam vessel, reached Liverpool, June 23; 30 days in transit.

JAMES PETIVER.

b. *between 1660 and 1670.*

*d. April 20, 1718.*

English botanist and naturalist who made a fine collection of rare and curious plants, animals and insects; this was afterwards purchased by Sloane, who was the founder of the British Museum. Petiver wrote several works on botany.

*We call them weeds; the while their uses hidden  
Might work a nation's weal, a nation's woe;  
Send thro' each wasted frame the balm of healing,  
And cause the blood with youth's quick pulse to flow.*  
—WEEDS: E. EVANS.

*One and all, be up and doing;  
Glory needs incessant wooing;  
And if Faith—not mere ambition—  
Prompts you to a noble mission,  
You shall rise;  
Like the acorn, small and flower-like  
To the skies.*

*Bide you yours;—of wealth not lustful;  
Ever patient, calm and trustful;  
Years shall magnify your bole,  
And produce immortal foliage of the soul.*  
—TO IMPATIENT GENIUS: CHARLES MACKAY.

23 B. C. — Pliny born. He was reputed the most learned man of his age, devoted his leisure to scientific studies and wrote a Natural History in thirty-seven books, which are still extant.

1839. — The first voyage of the "Great Western" was made from Bristol, England, to New York, in eighteen and one-half days. The "Sirius," starting from London, made the voyage in shorter time, by a few hours, than the other vessel.

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MEMORANDA AND DIARY.

OLIVER EVANS.

b. 1755.

d. April 21, 1819.

American engineer and inventor; invented a machine by which three thousand card-teeth could be turned off in a minute. He also invented an elevator, the conveyor, the hopperboy, the drill and the descender, and constructed a machine for cleaning docks. The application of steam to motion was his favorite object. In 1773 he invented a steam engine, the first in America; also the first steam engine on the high-pressure principle and the first steam dredging machine used in America.

*Go out into the world of toil, the battle for the right.*

*Ring, anvils, with your clangor!*

*Burn, forges, fierce and far!*

*The night shall bring the world of home,*

*Where love and goodness are.*

*Swing, hammers, with your clatter!*

*Whirl, wheels, and shaft and beam!*

*The light of love shall guide me home*

*From out this shroud of steam!*

*Under the bending wheel that glides forever to and fro.*

*Sing, mills, your clattering chorus.*

*Down where the millions sweat!*

*I bare my arms and give my strength*

*And joy in what I get!*

*The hearts that ring, the arms that cling,*

*When I unlatch the gate!*

*Clang with your mighty reed!*

*Roar, cities, with your strife!*

*And God be praised for strength to toil*

*For wage of love and life.*

—FOLGER McKINSEY.

PETER APJAN.

b. 1495.

d. April 21, 1552.

English mathematician and astronomer. He was the first to make it known that the tails of comets are always projected in an opposite direction from the sun and to propose the determination of longitude by lunar observation. He was knighted by Charles V.

*Who Motion, foreign to the smallest grain,*

*Shot through vast masses of enormous weight?*

*Who did brute Matter's restive lump assume*

*Such various forms, and gave it wings to fly.*

—Night Thoughts; Young.

*Learning was first made pilot to the world,*

*And in the chain of contemplation,*

*Many degrees above the burning clouds*

*He'd in his hands the ric-teaf'd marble book,*

*Drawn full of silver lines and golden stars.*

—Day's Law Tricks.

560 B. C.—The Zodiac was observed by Anaximander, who discovered its obliquity, named its twelve signs and assigned their situation.

140.—The Ptolemaic system of astronomy was introduced; it made the earth the centre of the system.

900.—Albategnius, the great astronomer, determined the length of the tropical year.

1858, June 2.—Dr. Giovanni Battista Donati discovered Donati's magnificent comet.

1858, Oct.—Donati's brilliant comet was long visible; its tail was said to be 40,000,000 miles long.

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THURSDAY.

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MEMORANDA AND DIARY.

## APRIL 22.

RICHARD ROBERTS.

b. April 22, 1789.

d. March 16, 1864.

English mechanic and inventor. He contrived the self-acting mule, an electro-magnet, wet gas-meters and dry planing-machines, iron billiard-tables and turret clocks, the centrifugal railway and the drill slotting-machine, an apparatus for making cigars and machinery for the propulsion and equipment of steamships. In 1832 he patented his invention of the Radial Arm for "winding on" in the self-acting mule, and later a machine for roving, slubbing, spinning and doubling cotton and other fibrous materials. In the locomotive he devised methods of manufacturing the crank-axle, of welding the rim and tires of the wheels, and an arrangement and form of the wrought-iron framing and axle-guards, and his system of templets and gauges. He invented the Jacquard punching-machine, to which he added his combined self-acting machine for shearing iron and punching both webs of angle and T-iron simultaneously to any required pitch.

*Fine sense and exalted sense are not half so valuable as common sense. There are forty men of wit for one man of sense; and he that will carry nothing about him but gold, will be every day at a loss for want of readier change.*

—Pope.

1100.—Cotton manufacture was introduced into Spain; 1641, into England.

JAMES CONNER.

b. April 22, 1798.

d.

American type-founder. He manufactured the first folio Bible ever printed in the United States, and cast his own type. He stereotyped Shakespeare's works and other books, and a polyglot Bible, for which he designed a new size of type, which he called agate. He invented a method of casting letters from an electrotyped matrix precipitation.

*First their nice hands the temper'd letter frame,  
Alike in height, in width, in depth, the same;  
Deep in the matrices secure infold,  
And fix within, and justify, the mould; take,  
The red amalgam from the cauldron, take,  
And flaming, pour, and, as they pour it, shake  
On the hard table spread the type congeal'd,  
And smooth and polish on its marble field;  
While, as his busy fingers either plies,  
The embryon parts of future volumes rise.  
Next with care the slender plate they choose,  
Of shining steel, and fit, with harden'd screws,  
The shifting sliders, which the varying line  
Break into parts, or yet as one confine;  
Whence firmly bound, and fitted for the chase,  
Imposed, it rests upon the stony base;  
Till, hardly driven, the many-figured quoin  
Convert to forms the accumulated lines.*

—Discovery of Printing: E. H. SMITH.

1590.—A copper-plate mill was invented by a German named Box.

1782.—Machines for ruling account-books, papers, etc., were invented by a Dutchman.



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MEMORANDA AND DIARY.

JOHANN GUTENBERG.

b. 1400. *d.* 1468  
German inventor of the art of printing with movable types. He has the best established right to the high distinction of being the inventor of printing. He was in partnership with his brother, which was dissolved in 1450, when he entered into another with Johann Faust, who furnished the capital while Gutenberg rendered personal services. The partnership was dissolved in 1455, after a lawsuit which was decided against Gutenberg. Gutenberg established another press in Mentz and in 1460 published the "Catholicon Joannis Januensis."

RUPERT: Friend John, what's wanted now? Ah! I can guess. 'Tis the old story,—money! \* \* \*  
Ah! John, that great invention, much I fear, Will come to naught. Take to some honest trade; Leave dreaming o'er thy scheme of movable types For multiplying copies of a book.

JOHN: I can make it plain To any mechanician, what I say Is but the sober truth. Ay, Master Rupert, The day will come when this same book, which now Few men are rich enough to own, will be So multiplied and cheap, that every peasant Can own it, if he chooses.

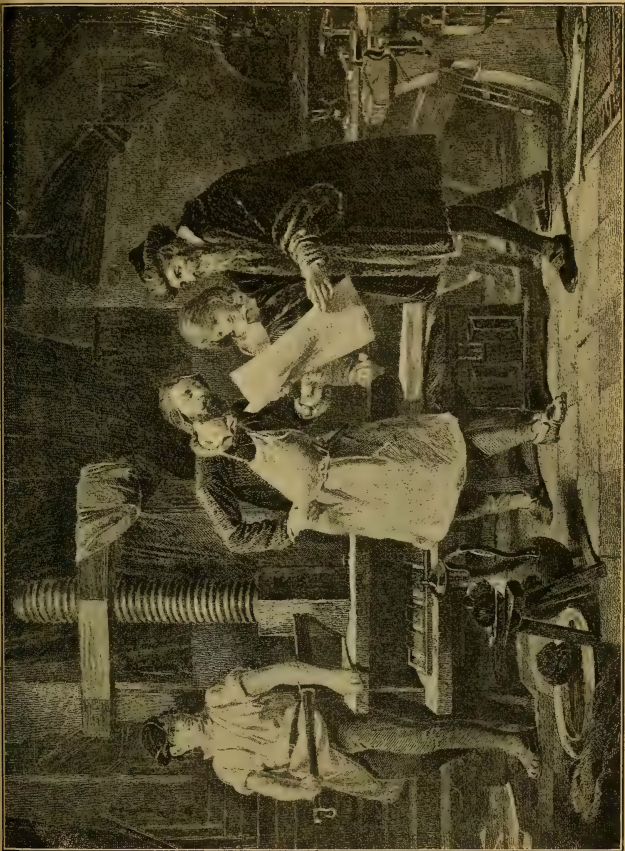
RUPERT: 'Tis for posterity thou art laboring, then! Now listen to a word of common sense:

JOHANN FAUST.

b. about 1400. *d.* 1466.  
A wealthy goldsmith of Mentz. He shares with Gutenberg and Schoeffer the honor of having invented printing. To Gutenberg, his partner, belongs the merit of the invention, which was perfected by Schoeffer, while Faust contributed the capital. The first noted work was a Latin Bible, printed between 1450 and 1455. In 1462 Faust took these Bibles to Paris, where the number and the uniformity of the copies so agitated Paris that Faust was said to be a magician or a devil. This is the supposed origin of Dr. Faustus and the Devil.

Man calls to man, and not in vain  
The cry to his ear is brought;  
All love, and labor, and hope, and pain  
Into each soul is wrought.  
Work on, ye presses, at life's behest,  
For light far spread, and for wrong redressed;  
Till time is ended, ye may not rest,  
Ye marvellous looms of thought!  
—Song of the Press: THE ARGOSY.

Posterity will nothing do for thee.  
Posterity will put upon thy back  
No coat to shield thee from the winter's cold.  
Posterity will give no single meal,  
Though thou wert starving. Why shouldst thou then, John,  
Labor for such an ingrate as this same  
Vain, unrequiting herd,—posterity?





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MEMORANDA AND DIARY.

EDMUND CARTWRIGHT.

b. *April 24, 1743.* d. *October 30, 1823.*

English inventor. He constructed a power-loom without having seen the ordinary hand-loom, and patented it April 4, 1785. His was not the earliest power-loom but was the first by which wide cloth, such as calico, was woven for practical purposes. His wool-combing machine contributed greatly to lessen the cost of woollen goods. He constructed a new steam engine, patented in 1797, in which alcohol was wholly or in part substituted for water. He co-operated with Robert Fulton in his experiments for the application of steam to navigation.

*Therein I hear the Parca reel,  
The threads of man at their humming-wheel,  
The threads of life, and power, and pain,  
So sweet and mournful falls the strain.  
And best can teach its Delphian chord  
How Nature to the soul is moored,  
If once again that silent string,  
As erst it wont, would thrill and ring.*

— *The Harp*: EMERSON.

450 B. C.—Cotton cloths known to have been woven in parts of Asia and in Egypt.

1788, April 12.—First power-loom set up at Philadelphia.

1790, December.—First successful American cotton factory started at Pawtucket, R. I., by Samuel Slater, Englishman.

1793.—First mill for manufacture of cotton-yarns erected by Samuel Slater.

CHRISTIAN HUYGENS.

b. *April 24, 1629.* d. *June 5, 1695.*

Dutch natural philosopher, inventor of the pendulum clock, and first to determine the numerical value of the acceleration of gravity. In 1661 he made known his method of grinding the lenses with long focus with which he made his astronomical discoveries. He invented the spiral spring for regulating the balances of watches, a contrivance in which he was anticipated by Hooke.

*Swing, swing, swing, you plod along your weary way;  
Swing, swing, swing, now here, now there, now here again,  
And pausing never, night or day,  
You plod along your weary way, swing, swing, swing.*  
*Swing, swing, swing, while hours and days and weeks roll by;  
Swing, swing, swing, untiring still you faithful tell  
The busy moments as they fly,  
The months and years that hasten by, swing, swing, swing.*

*Swing, swing, swing, a lesson I may learn from thee;  
Swing, swing, swing, a warning take no time to lose;  
To prize the moments as they flee,  
Lest months and years resultless be, swing, swing, swing.*  
— *The Pendulum*: L. O. EMERSON.

*We could count time by heart-throbs; he most  
lives who thinks most, speaks the noblest, acts the  
best.*

1477.—Watches were first made at Nuremberg.

1857.—Watches were successfully made by machinery.

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MEMORANDA AND DIARY.

## APRIL 25.

SIR MARK ISAMBARD BRUNEL.

b. April 25, 1769.

d. December 12, 1849.

French engineer. In 1794 began surveys for the Champlain Canal. In New York he built the Park Theatre and had charge of fortifications in the harbor. His design for the national capital was rejected as too expensive. In England he invented machinery for cutting blocks used in the rigging of ships; he constructed the Thames Tunnel and other important works. He devised machinery for the manufacture of shoes, in which pins took the place of thread; machines for twisting cotton and forming it into balls, for hemming paper, and for making wooden boxes and nails; a hydraulic packing press; new suspension bridges, and a method of building wide and flat arches without centerings. He perfected the circular-saw.

*Work explores the secrets of the universe, and brings back those contributions which make up the sum of human knowledge. It counts the ribs of the mountains, and feels the pulses of the sea, and traces the foot-paths of the stars, and calls the animals of the forest, and the birds of the air, and the flowers of the field, by name. It summons horses of fire and chariots of fire from heaven, and makes them the bearers of its thought. It plunders the tombs of dead nationalities, and weaves living histories from the shreds it finds.*

—The Results of Work; DR. J. G. HOLLAND.

GUGLIELMO MARCONI.

b. April 25, 1874.

d.

Bologna University.

Italian electrical engineer and inventor of "wireless telegraphy." With the help of a transmitter, a receiver, an ordinary Morse tapping machine and two batteries attached to a wire netting at the top of an improvised mast, he succeeded in signaling to a distance of more than ten miles. He has since perfected his system so that he can communicate messages between stations on opposite shores of the Atlantic.

*Youth!*

*All possibilities are in its hands,  
No danger daunts it, and no foe withstands;  
In its sublime audacity of faith,  
"Be thou removed," it to the mountain saith,  
And with ambitious feet, secure and proud,  
Ascends the ladder leading on the cloud.*

—Moriart Salutamus; LONGFELLOW.

*Prospero's Ariel, in our Shakespeare's phrase,  
In forty minutes round about the earth  
Would put a girdle, compassing its girth  
With thought's electric band.*

*Yet you, Marconi, you have shamed us all—  
Foets or builders in the realm of things—  
Stern realists or scaler of the steep—  
Blithe Ariel is a droner by the wall.*

*And Thought herself has taken your magic wings,  
Speeding to Thought across the awful deeps!*

—MARCONI; JOHN JEROME ROONEY.



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MEMORANDA AND DIARY.

# APRIL 26.

IMMANUEL KANT.

b. *April 26, 1724.*

d. *February 12, 1804.*

German metaphysician and astronomer. Founder of the Critical or Transcendental school of philosophy in Germany. About 1755 he lectured on logic, physics, metaphysics and mathematics. He determined proper limits and true position of the human intellect in relation to knowledge, and that many mental phenomena are explained by referring to essential laws which regulate the mind. His theory was that the sun and its attendant planets existed originally in the form of a nebula, which, by cooling, condensing and revolving, was formed into the sun, and rings of matter thrown off from this, by being condensed, became planets. He wrote "Thoughts on the True Estimation of the Living Powers," "Critique of Pure Reason" and "Universal Natural History and Theory of the Heavens."

*Let there be light! proclaim'd the Almighty Lord,  
Astonish'd Chaos heard the potent word!—  
Through all his realms the kindling Ether runs,  
And the mass starts into a million suns;  
Earths round each sun with quick explosions burst,  
And second planets issue from the first;  
Bend, as they journey with projectile force,  
In bright ellipses their reluctant course;  
Orbs wheel in orbs, round centers centers roll,  
And form self-balanced, one revolving whole.  
Onward they move amid their bright abode,  
Space without bound, the bosom of their God!*

—Botanic Garden; DR. DARWIN.

HENRY KATER.

b. *April 16, 1777.*

d. *April 26, 1835.*

English mathematician. Distinguished for his investigations of the principles of reflecting telescopes; for his experiments to determine the exact length of the seconds-pendulum; for his improvements in measures and weights; and for his invention of the floating collimator, an instrument for adjusting telescopes. He devised an improved method of dividing astronomical circles on the principle of the beam-compass.

*Threifold the stride of Time, from first to last!  
Lolling slow, the Future creepeth—  
Arrow-swift, the Present sweepeth—  
And motionless forever stands the Past.  
—Sentences of Confucius—Time: SCHILLER.*

*We are to know that we are never without a pilot.  
When we know not how to steer, and dare not  
hoist a sail, we can drift. The current knows the  
way though we do not. The ship of heaven guides  
itself and will not accept a wooden rudder.  
—Sovereignty of Ethics.*

336 B. C.—Callippus, the astronomer, first calculated eclipses.

1543.—Copernicus, canon and physician at Fraunburg, published his system of astronomy.

1825.—The helioscope, a telescope for observing the sun without injury to the eye, was invented by Christopher Scheiner.

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1904.

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MEMORANDA AND DIARY.

SAMUEL FINLEY BREESE MORSE.

b. April 27, 1791.

d. April 2, 1872.

American inventor and founder of the American system of electro-magnetic telegraph. He was associated with his brother, Sidney E., in the invention of an improved pump. The electro-magnetic and chemical recording telegraph essentially as it now exists was planned and drawn on shipboard, but he did not produce his working model till 1835, nor his relay till later. Until the telegraph absorbed his attention, he was engaged in experimenting toward the perfecting of the daguerreotype, and he shares with Prof. Draper the honor of being the first to make photographs of living persons. He patented a machine for cutting marble in 1823.

*He who first stretched his nerves of subtle wire  
Over the land and through the sea-depths still,  
Thought only of the flame-winged messenger  
As a dull drudge that should encircle earth  
With sordid messages of Trade. But the Muse  
Not long will be defrauded. From her foe  
Her misused wand she snatches; at a touch  
The Age of Wonder is renewed again,  
And to our disenchanting day restores  
The shoes of Swiftiness that give odds to Thought,  
The Cloak that makes invisible.*

—Science and Poetry: JAMES RUSSELL LOWELL.

*Hark! The warning needles click,  
Fither—thither—clear and quick.  
He who guides their speaking play*

ANDRONICUS.

b. (Lived in 1 C.)

d.

Greek architect of Cyrrhesthes in Macedonia. He built the octagonal Tower of the Winds at Athens and invented weathercocks. The Tower is now converted into a mosque for dervishes. It has been imitated in modern buildings.

*The Grecian gluts me with its perfectness,  
Unanswerable as Euclid, self contained,  
The one thing finished in this hasty world,  
Forever finished, though the barbarous pit,  
Fanatical on hearsay, stamp and shout  
As if a miracle could be encased.*  
—The Cathedral: LOWELL.

1400 B. C.—The arch appeared.

473 B. C.—The Temple of Victory was built.

469 B. C.—The Theseum, the most perfect edifice in the world was built.

450–438 B. C.—The Parthenon on the Acropolis was completed by Ictinus and Callicrates under Phidias.

410 B. C.—The Erechtheum was rebuilt; it was an Ionic temple of the Acropolis in honor of Erechtheus.

*Stands a thousand miles away!  
Here we feel the electric thrill  
Guided by his simple will;  
Here the instant message read,  
Brought with more than lightning speed.  
Sing who will of Orphean lyre,  
Ours, the wonder-working wire!  
—The Electric Telegraph: ANONYMOUS.*

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MEMORANDA AND DIARY.

PETER GUTHRIE TAIT.

b. April 28, 1831.

Scottish mathematician and scientist. Contributor to the theory and practice of thermo-dynamics, 1856-'85.

*No, no! I'm the spirit of light and love;  
To my unseen hands 't is given  
To pencil the ambient clouds above,  
And polish the stars of heaven,  
I scatter the golden rays of fire  
On the horizon far below,  
And deck the skies where storms expire  
With my red and dazzling glow.*  
—*The Song of Lightning*: GEORGE W. CUTTER.

*Reading maketh a full man, conference a ready man, and writing an exact man; and, therefore, if a man write little, he had need have a great memory; if he confer little, he had need have a present wit; and if he read little, he had need have much cunning, to seem to know what he doth not.*  
—BACON.

1630.—Francis Bacon suggested that heat might be motion.  
1765.—James Watt invented a method of condensation for steam-engines in a separate cylinder.  
1773-1829.—Thomas Young lived and assisted in establishing the vibratory theory of heat.  
1798.—Count Rumford published his experiments on heat produced by friction.  
1812.—Humphrey Davy asserted that heat was motion.  
1820.—François J. D. Arago and Pierre Louis Dulong experimented on the elastic force of steam at different temperatures.

WILLIAM ALLAN.

b. d.

Scottish farmer and mechanic; inventor of the iron plow. He was the son of a smith and farrier. He attempted various improvements on the rustic implements which he used. In 1803-4 he first conceived the idea of substituting the iron plow for the plow-wood. He constructed a plow which he used on his own farm. It soon acquired fame. Many improvements have been made upon the first rude attempt of Allan, but the principle in all cases remained unaltered. Many profited by this invention while the peasant inventor remained in obscurity.

*Clang, clang! We forge the colter, now,  
The colter of the kindly plow.  
Propitious heaven, O bless our toil!  
May its broad furrow still unbind  
To genial rains, to sun and wind,  
The most benignant soil.  
Clang, clang!*  
*Our colter's cleaving course shall be  
On many a sweet and sheltered lee,  
By many a streamlet's silver tide:  
Along the green hill's side.*  
—*Song of the Forge*.

1822.—Steam plow worked for the first time in England.  
1846.—The manufacture of steam plows was first begun (England).  
1846.—The first patent for a steam plow was obtained in England by Clark, Vreeman and Varley.

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MEMORANDA AND DIARY.

NICHOLAS ZABAGLIA.

b. 1674.

d.

1750.

Italian architect. His first occupation was that of a carpenter at the Vatican, but the various masterly mechanical engines which he invented, and the abilities he displayed, caused him to be appointed architect of St. Peter's. He is the inventor of the method by which fresco paintings are transferred from the plaster on which they were originally executed.

*The hand that rounded Peter's dome,  
And groined the aisles of Christian Rome  
Wrought in a sad sincerity;  
Himself from God he could not free;  
He builded better than he knew;  
The conscious stone to beauty grew.*

—The Problem; EMERSON.

*The next arose 'mid thunder of elements at strife,  
And in the throes of traffic, the moil and toil of life,  
A worker swung the hammer, another builded high,  
Till cities rose in splendor against the golden sky.*

—The Golden Dream; MCKINSEY.

*Labor molds the brick, and splits the slate, and  
quarries the stone, and shapes the column, and  
rears not only the humble cottage, but the gorgeous  
palace, and the tapering spire, and the stately dome.*

—REV. NEWMAN HALL.

484 B. C.—The temple on the river at Ilissus was erected.

481 B. C.—One at Agrigentum was begun.

383 B. C.—The Mausoleum at Halicarnassus was erected.

ADOLPH HEINRICH JOSEPH SUTRO.

b. April 29, 1830.

d.

German-American mining engineer. He planned the now famous Sutro tunnel through the heart of the mountain where lay the Comstock lode. Having interested capitalists, he obtained a charter from the Nevada Legislature on February 4, 1865, and the authorization of Congress on July 25, 1866. The work was begun on October 19, 1869. In 1879 the great tunnel was finished, and its projector became a millionaire many times over.

*Heroes who brought from every clime*

*Rich argosies of wealth;*

*Heroes of thoughts and deeds sublime,*

*Who spurned what came by stealth;*

*Who won a guerdon fair and bright,*

*And left no bloody stain—*

*No hearth profaned—no deadly light—*

*Upon God's wide domain.*

—Heroes of Industry; G. P. R.

*For him I built a palace underground,*

*Of iron, black and rough as his own hands.*

*Deep in the groaning, disembowel'd earth,*

*The tower broad pillars and huge stanchions,*

*And slant-supporting wedges I set up,*

*Aided by the Cyclops who obey'd my voice,*

*Which through the metal fabric rang and peal'd*

*In orders echoing far, like thunder-dreams.*

—Building of the Palace Possidon; RICHARD H. HARNE.

1868, June 16.—Mont Cenis tunnel was opened.

1872.—The St. Gothard tunnel was begun, 9¼ miles long.



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MEMORANDA AND DIARY.

KARL FRIEDRICH GAUSS.

b. April 30, 1777. d. February 23, 1855.

German mathematician who was devoted to the theory of numbers. He invented the heliotrope (an instrument to show when the sun reached the tropics), which he used in a triangulation between Göttingen and Altona about 1822. His profound works, though produced with astonishing rapidity, were elaborated with the greatest care, and they mark an era in the history of science. He published "Arithmetical Disquisitions" (1801) and "Theory of the Motion of the Celestial Bodies" (1809), in which he developed an improved method for calculating the orbits of planets and comets. This was a worthy sequel to Laplace's "Mécanique Céleste," in which he had enshrined all that was known on the planetary results of gravitation.

*Where in the realm of thought, whose air is song,  
Does he, the Buddha of the West, belong?  
He seems a winged Franklin, sweetly wise,  
Born to unlock the secrets of the skies. . . .  
If lost at times in vague aerial flights,  
None treads with firmer footstep when he lights;  
A soaring nature, ballasted with sense,  
Wisdom without her wrinkles or pretense.*

—At the Saturday Club; HOLMES.

1830-32.—Evariste Galois published his Theory of Equations and Theory of Numbers.

ROBERT FITZROY.

b. July 5, 1805. d. April 30, 1865.

English meteorologist; gave to the world one of the most valuable systems of weather prognostics ever conceived. He published "Remarks on New Zealand" (1846), and "Sailing Directions for South America" (1848).

*It is a good divine that follows his  
Own instructions; I can easier teach twenty  
What were good, to be done, than be one  
Of the twenty to follow mine own teaching;  
The brain may devise laws for the blood; but  
A hot temper leaps o'er a cold decree.*

—The Merchant of Venice; SHAKESPEARE.

*The Western World's true child and nursing he  
Equipt with aptitudes enough for three;  
No eye like his to value horse or cow,  
Or gauge the contents of a stack or mow;  
He could foretell the weather at a word.*

—Fitz Adam's Story; LOWELL.

1643.—Viviani performed the Torricellian experiment, showing the height of a column of mercury sustained by the weight of the atmosphere, which was explained by Torricelli.

1868, July 27.—The nephoscope, an apparatus for measuring the velocity of clouds, invented by Karl Braun, was reported to the Academy of Sciences.

1870.—United States meteorological service established.

1872, Nov.—Discovery of an atmospheric wave overlying nearly the entire territory between the two great oceans, was reported by Chief of Signal Service.

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SATURDAY.

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MEMORANDA AND DIARY.

RICHARD PENNEFATHER ROTHWELL.

b. May 1, 1837. d. April 17, 1901.

Rensselaer Polytechnic, 1858.

American mining engineer and writer on industrial topics. He worked for a time in a cable and wire rope manufactory in London, and became one of its superintendents. He devised some wire rope making machinery, which is in use at the present day. In 1873 he became editor of the "Engineering and Mining Journal," which position he held until his death. He was the publisher of "The Mining Industry: Its Statistics, Technology, and Trade," an annual encyclopedia, which he began in 1892 and which received a gold medal at the Paris Exposition of 1898. He founded the American Institute of Mining Engineers at Wilkesbarre, Penn., in 1871, and in 1882 became its president.

*For many barren ages earth hid her treasures deep,  
And all her giant forces seemed bound as in a sleep;  
Then Labor's "anvil chorus" broke on the startled air,  
And lo! the earth in rapture laid all her riches bare.*  
*'Tis toil that over nature gives man his proud control,  
And purifies and hallows the temple of his soul;  
It scatters foul diseases with all their ghastly train,  
Puts iron in the muscle, and crystal in the brain.*

—Honor to Workmen; H. CLAY PERUSS.

1840.—Wire-drawing was invented by Rudolph at Nuremberg, Bavaria.

RUFUS PORTER.

b. May 1, 1801. d. August 13, 1884.

American inventor. Invented a score or more of important labor-saving devices. Had the inventor's usual career. Founded the "American Mechanic" and the "Scientific American," August 28, 1845.

*Pick and click*

*Goes the type in his stick.*

*As the printer stands at his case;*

*His eyes glance quick, and his fingers pick*

*The type at a rapid pace;*

*And one by one, as the letters go.*

*Yet the type they look but leaden and dumb,*

*As he puts them in place with finger and thumb;*

*O, where is the man with such simple tools*

*Can govern the world as I?*

—J. C. PIERCE.

1428.—Laurentius Coster employed metal types.

1436.—The art of printing from movable type was invented by Johann Gutenberg, at Mentz.

1853.—Wm. H. Mitchell invented a typesetting machine.

1888.—The linotype, for casting type by machinery, operated by a keyboard, was perfected by the inventor, Ottmar Mergenthaler, of Baltimore; speed, 3,000 to 6,000 ems per hour.

The Chinese claim that we are indebted to them for the art of printing and movable types, and for the mariner's compass, stoves, chain bridges, spectacles, chain pumps, India ink, silver forks, winnowing machines and tread-mills.

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MEMORANDA AND DIARY.

## LEONARDO DA VINCI.

b. 1452.

d. May 2, 1519.

Italian painter, sculptor, teacher and engineer. He was very talented, and brought the art of painting to a high degree of perfection. Had he confined his powers to that art, he would probably never have been surpassed; but he was a most prolific experimenter, and the forerunner of Galileo. He is the reputed inventor of the wheelbarrow; and he experimented with flying machines in 1500 and designed an apparatus to propel a pair of wings.

*He is the greatest artist, then,  
Whether of pencil or of pen,  
Who follows Nature. Never man,  
As artist or as artisan,  
Pursuing his own fantasies,  
Can touch the human heart, or please,  
Or satisfy our nobler needs.*

—Keramos: LONGFELLOW.

1505.—Giovanni Bellini painted the Madonna with Saints.

1511.—Albert Durer painted the Trinity.

1512.—Albert Durer was made court painter by Maximilian. He invented etching.

1515.—Nuremberg gave him a yearly pension of 100 gulden.

1735-1785, May 13.—William Woollett lived. His landscapes, both etched and engraved, are ranked among the most exquisite works of the kind.

1783.—François Blanchard, the aeronaut, constructed and used the parachute.

## ATHANASIUS KIRCHER.

b. May 2, 1602.

d. November 28, 1680.

German mathematician. Invented the magic lantern, although, according to some, it was known four centuries earlier to Roger Bacon. Reputed inventor of the Æolian harp, 1653. Both he and Sir Samuel Morland claimed to have invented the speaking trumpet.

*Physical investigation helps to teach us the actual value and right use of the Imagination—of that wondrous faculty, which, left to ramble uncontrolled, leads us astray into a wilderness of perplexities and errors, a land of mists and shadows; but which properly controlled by experience and reflection, becomes the noblest attribute of man; the source of poetic genius, the instrument of discovery in Science, without the aid of which Newton would never have invented fluxions, nor Davy have decomposed the earths and alkalis, nor would Columbus have found another continent.*

—Address to Royal Society, November 30, 1859:

SIR BENJAMIN BRODIE.

The harp is traced to the earliest nations. The lyre of the Greeks is the harp of the moderns. The celebrated Welsh harp was strung with gut, and the Irish harp, like the more ancient harp, with wire.

1709 (about).—Bartolomeo Christofori, of Florence, made a piano-forte.

1717.—J. Schroder is reputed to have invented the piano-forte.

1752, April 5.—1831, August.—Sebastian Erard lived, and invented a piano, and the harp with two pedals.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

JONATHAN HOMER LANE.

b. August 9, 1819.

d. May 3, 1880.

American mathematician. Among his important inventions were : a machine for finding the real roots of the higher equations ; a machine for very exact uniform motion ; a visual telegraph ; a visual method for the comparison of clocks at great distances apart ; an improved basin for mercurial horizon, and a mechanism for holding the Drummond light and reflector on shipboard. One of his memoirs was " On the Law of Induction of an Electric Current on Itself " (1851).

*O Mercury, hot planet, burying deep  
Thy forehead in the sunlight, list to me !  
I groan beneath thy influence. Thou dost urge  
The myriad hands of Labor, and with toil  
Dost mar my features ; day by day doth work  
Thy steady changes on mine ancient face,  
Till all the host of heaven blank wonder look,  
Nor know the fresh, primeval-moulded form  
That like the Aphrodite, rose from chaos,  
Smiling through dew upon the first morn's sun.*  
—The Song of the Earth : GEORGE H. BORER.

*Away, then, young man, with all dreams of  
superiority, unless you are determined to dig after  
knowledge, as men search for concealed gold !  
Remember, that every man has in himself the prin-  
ciple of great excellence, and he may develop it by  
cultivation if he will try.*  
—Mind, the Glory of Man.

DAEDALUS.

b.

d.

First well-known sculptor among the Greeks. He was the first to place his statues in natural positions and to make the eyes open. On account of these improvements the Greeks said that his divine genius made statues walk, see and speak. His disciples and imitators were called "Daedalides." The axe, wedge and lever were invented by him, and also masts and sails for ships, 1240 B. C. He is also credited by some historians with constructing automata that imitated the motions of the human body and moved about by means of mechanism contained within themselves.

*Great Daedalus of Athens was the man  
That made the draught, and form'd the wondrous plan ;  
Where rooms within themselves encircled lie,  
With various windings, to deceive the eye.*

*Such was the work, so intricate the place,  
That scarce the workman all its turns could trace ;  
And Daedalus was puzzled how to find  
The secret ways of what himself design'd,*  
—Ovid's Metamorphoses.

2300-2256 B. C.—Amen-em-hat III. was famous for his engineering work ; he built a dam 27 miles long, averaging 30 feet high, by which the artificial lake called Meoris was formed. It was 14 miles long, 6 to 11 wide, and covered 80 square miles ; it was constructed for storing water. He also built the famous Labyrinth, a large palace for ceremonial acts and sacrifices.



1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

JEAN CHARLES BORDA.

b. May 4, 1733.

d. February 20, 1799.

French mathematician and astronomer, civil and naval engineer. We owe to him the introduction of the reflecting circle, as the chief instruments for stellar observations at sea. He invented the repeating circle, so long a favorite in conducting geodetic surveys. He found the length of the seconds pendulum by methods so well chosen and exact that his name has been coupled with Coulomb's as one of the fathers of precise experiment in France. He contributed greatly to the improvement of ship chronometers. He obtained at his own expense the calculating and printing of that extensive table of logarithmic sines, etc., still bearing his name, adapted to the decimal division of the circumference of the circle.

*And there I find, by faithful hand portrayed,  
The studious plodder, wasting midnight oil,  
Who, patient, hides in academic shade,  
Enriching nations with his treasured toil  
And there, the traveller's unwearied toil  
As in a mirror is displayed to view;  
Men, manners, products of each foreign soil,  
Things rich and rare, and wonderful and new,  
Concentrated, compressed; yet still distinct and true.  
—To the Editor of Time's Telescope: ALEXANDER BALFOUR.*

1850.—Villeroli invented the Telemeter or Stadia.

LOUIS JACQUES THENARD.

b. May 4, 1777.

d. June 21, 1857.

French chemist. Gay-Lussac and he discovered boron and proved that exymuriatic acid is a simple substance. He discovered peroxide of hydrogen. He wrote "Elementary Treatise on Theoretical and Practical Chemistry" (1813).

*Oh! would that I, my Mary, were an acid—  
A living acid; thou an alkali  
Endowed with human sense; that brought together,  
We both might coalesce into one salt, thou  
One homogeneous crystal. Oh, that thou  
Wert carbon, and myself hydrogen!  
We would unite to form elegant gas  
Of common coal, or naphtha. Would to heaven  
That I were phosphorus and thou wert lime,  
And we of time composed a phosphuret!  
I'd be content to be sulphuric acid,  
So that thou might be soda.  
Couldst thou potassia be, I aquafortis,  
Our happy union should that compound form,  
Nitrate of potash—otherwise saltpeter.  
And thus, our several natures sweetly blent,  
We'd live and love together, until death  
Should decompose this fleshy Tertium Quid,  
Leaving our souls to all eternity  
Amalgamated! Sweet, thy name is Briggs,  
And mine is Johnson. Wherefore should not we  
Agree to form a Johnsonate of Briggs?*

—A Chemist's Valentine; EDWARD J. WICKSON.

1807, October 6.—Sir Humphrey Davy separated potassium, sodium, etc., by the galvanic current.

1904.

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MEMORANDA AND DIARY.

AUGUST WILHELM VON HOFMANN.

b. April 8, 1818.

d. May 5, 1892.

German chemist. He investigated the basis of coal-tar and the metamorphoses of indigo. He made successful researches regarding ammonia and its derivation, especially aniline. In 1849 he made the important discovery that alcoholic groups can be gradually substituted for the atoms of hydrogen in ammonia, and by this process are produced an almost unlimited number of bodies whose knowledge and study have had a prominent influence upon the development of modern organic chemistry. His further studies on the derivatives of ammonia led him to the discovery of the so-called ammonia bases (1851).

*The toils of Alchemists, whose vain pursuit  
Sought to transmute  
Dross into gold,—their secrets and their store  
Of mystic lore,  
What to the fiding modern do they seem?  
An ignis fatuus chase, a phantasy, a dream!*

*Yet for enlightened moral Alchemists  
There still exists  
A philosophic stone, whose magic spell  
No tongue may tell,  
Which renovates the soul's decaying health,  
And what it touches turns to purest mental wealth.*

—HORACE SMITH.

2847 B. C.—Wine was made from the grape.

JOSEPH BIENAIME CAVENTOU.

b. June 30, 1795.

d. May 5, 1877.

French chemist. He was associated with Pelletier in the discovery of sulphate of quinine about 1820, and he discovered crotonylene in 1865. He published a "New Chemical Nomenclature" (1816) and an "Elementary Treatise on Pharmacy" (1819).

*There be in plants  
Influences yet unthought, and virtues, and many inventions,  
And uses above and around, which man hath not yet regarded.  
Not long, to charm away disease, hath the crocus yielded up its  
bulb,  
Nor the willow lent its bark, nor the nightshade its vanquished  
poison;  
Nor the many-colored dahlia, nor the gorgeous flaming cactus,  
Nor the multitude of fruits and flowers ministered to life and  
luxury.  
And the meanest weed of the garden serveth unto many uses,  
The salt tamarisk, and juicy flag, the freckled orchis, and the  
daisy.  
The world may laugh at famine when forest trees yield bread,  
When acorns give out fragrant drink, and the sap of the linden  
is as fatness;  
For every green herb, from the lotus to the dandel,  
Is rich with delicate aids to help incurious man.*

—M. F. TUPPER.

1819-1884.—Jean Augustin Barral lived. He first extracted nicotine from the tobacco leaf and made known its highly poisonous qualities.

1859.—Christian Schonbein announced his discovery of antozone, a modification of oxygen, hitherto found only in the compound state.

1904.

THURSDAY.

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MEMORANDA AND DIARY.

SIR JAMES YOUNG SIMPSON.

b. 1811.

d. May 6, 1870.

English physician. Discoverer of the anaesthetic properties of chloroform. His professional works are numerous and have been translated into nearly every European language.

*God of the art that heals the shattered frame,  
And poetry that soothes the wounded mind,  
Ten thousand temples, honoured with thy name,  
Attest thy ceaseless blessings to mankind.*

—*The Shrike of Prometheus*: HORACE SMITH.

1792.—Baron Justice Von Liebig discovered chloroform and chloral.

1776.—Dr. Joseph Priestley discovered nitrous oxide gas (laughing gas).

1819.—Wm. Thos. Green Morton, dentist, discovered the use of ether as anaesthetic.

1831.—Dr. Samuel Guthrie discovered chloroform; and used it only as a medicine.

1832, Jan. 2.—Chloroform was first used by inhalation at New Haven.

1864.—Nitrous oxide was first used as anaesthetic.

1866.—The use of nitrous oxide gas (laughing gas) was introduced in Paris.

1884.—Cocaine was first used as anaesthetic in ophthalmic and other surgical operations.

LEOPOLD AUENBRUGGER VON AUENBRUG.

b.

1732.

d.

1809.

Austrian physician, who wrote two treatises on insanity. He was the inventor of percussion; the practice of which was neglected until Corvisart revived it in 1808.

*How like eternity doth nature seem  
To life of man—that short and fitful dream,  
I look around me: nowhere can I trace  
Lines of decay that mark our human race.  
These are the murmuring waters, these the flowers  
I mused o'er in my earlier, better hours.*

*Long years have passed since this was last my home  
And I am weak, and toil-worn is my frame;  
But all this vale shuts in is still the same;  
'Tis I alone am changed.*

—*The Constancy of Nature*: R. H. DANA.

*Dark night, that from the eye his function takes,  
The ear more quick of apprehension makes;  
Wherein it doth impair the seeing sense,  
It pays the hearing double recompense.*

—SHAKESPEARE.

422 B. C.—Hippocrates, the father of medicine, flourished.

400 B. C.—The structure of the human body was first studied and became a branch of medical education under Hippocrates.

390 B. C.—He separated medicine from the priesthood.

500.—Aetius, an eminent surgeon, flourished.

1622.—Lacteals of the intestines were discovered by Asellius.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## ALEXIS CLAUDE CLAIRAUT OF CLAIRAULT.

b. May 7, 1718.

French geometer; the first to apply the theory of Newton to estimate the perturbing influence of planets on motions of comets. Some of his works are "Researches on Curves of Double Curvature" (1731); "Theory of the Figure of the Earth" (1743); "Theory of the Moon Derived from the Simple Principle of Attraction" (1750); "Theory of the Motion of Comets" (1760).

*Oh, but for time to track*

*The upper stars into the pathless sky—*

*To see the invisible spirits, eye to eye—*

*To hurl the lightning back—*

*To tread unburt the sea's dim-lighted halls—*

*To chase Day's chariot to the horizon-walls!*

—*The Dying Alchemist*; N. P. WILLIS.

*God is a worker. He has thickly strewn infinity with grandeur. God is love; He yet shall wipe away creation's tears, and all the worlds shall summer in his smile. Why woe I not? The veriest mote that sports its one-day life within the sun-beam has its stern duties.*

—ALEXANDER SMITH.

1783.—Herschel proved the binding rotary motion of the stars.

1786.—He discovered star clusters and nebulae, and the motion of the solar system toward Hercules.

1787, April 19.—He observed three lunar volcanoes, and discovered two of the satellites of Uranus.

## ERATOSTHENES.

b. 276 B. C.

d. about 196 B. C.

Famous Greek geometer and astronomer, and the librarian of the great library of Alexandria. He is recognized by some as the founder of genuine astronomy. Among his remarkable operations was the measurement of the obliquity of the ecliptic, which he computed to be  $23^{\circ} 51' 20''$ . He also made an attempt to ascertain the dimensions of the earth by a method which has been used with success in modern times, and which he invented.

*To the open ear it sings the early genesis of things—*

*Of tendency through endless ages, of star dust and star pilgrimages,*

*Of rounded worlds, of space and time, of the old floods subsiding slime,*

*Of chemic matter, force and form, of poles and powers, cold, wet and warm,*

*The rushing metamorphoses, dissolving all that fixture is,*

*Melts things that be to things that seem,*

*And solid nature to a dream.* —EMERSON.

*I look upon a library as a kind of mental chemist's shop, filled with the crystals of all forms and hues which have come from the union of individual thought with local circumstances or universal principles.*

—*The Poet at the Breakfast-Table*; O. W. HOLMES.

1716.—Edmund Halley suggested that the distance of the earth from the sun might be estimated by observing the transit of Venus, and devised a plan for doing so.



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MEMORANDA AND DIARY.

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## CHARLES BLACHFORD MANSFIELD.

b. May 8, 1819.

d. February 26, 1855.

English chemist. He showed that toluene was contained in coal-tar. He originally discovered hydrocarbons of the empirical formula  $C_9H_{12}$  in coal-tar. The day of the light tar-oils came when, in his patent specification (1847), he for the first time accurately described the composition of those oils, along with a process for preparing benzene in a pure state and on a large scale, and with proposals for utilizing the tar-oils of lowest boiling-point for lighting purposes. His "Theory of Salts" is his most important contribution to theoretical chemistry.

*Though bold hands lift up the thin curtain  
That hides the unknown from our sight;  
Though a shadowy faith becomes certain  
Of the new life that follows death's night;  
Though miracles past comprehending  
Shall startle the heart in your breast,  
Still, still will your thirst be unending,  
And your soul will be sad with unrest.*

—ELLA WHEELER WILCOX.

1880.—Baron Justice von Liebig's analysis of organic substances appeared at Giesen.

1884.—Runge first obtained colored compound from coal-tar products.

1887.—Coal-tar colors were invented by Otto P. Runge.

1886.—W. H. Perkins obtained a violet dyestuff by oxidizing impure aniline with chromic acid, and the great modern color industry dates from that experiment.

## JOHN SCOTT RUSSELL.

b. May 8, 1808.

d. June 8, 1882.

English civil engineer. To improve the shapes of vessels he made researches into the nature of waves. He showed the wave of translation, and developed the wave-line system of construction of ships. He constructed the "Great Eastern," and became joint designer of the "Warrior," the first sea-going armored frigate. His greatest work apart from shipbuilding was the dome of the Vienna Exhibition in 1873. He also designed a high-level bridge to cross the Thames below London Bridge.

*Trade-winds, observing well their stated course,  
To human good employ their powerful force;  
The loaded ships across the ocean funn'd  
By steady gales, spread commerce through the land:  
These you observe—but have you no desire  
The hidden spring of such effects to inquire?  
Or, when contending winds around you blow,  
Do you ne'er wish the cause of them to know?*  
—WATTS.

1616.—A vessel, the "Restless," built in America by Adrian Block at Manhattan Island.

1679.—First vessel was built on the Lakes, the "Griffin," by La Salle on the Niagara River, near present Buffalo, in which he sailed to Green Bay, Wis.

1697.—Peter the Great visited Holland and England, and worked in the dockyard at Deptford, England, to learn the art of shipbuilding.

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· MEMORANDA AND DIARY.

## MAY 9.

JAMES LAURIE.

b. *May 9, 1811.*

Scotch-American civil engineer. He was chief engineer in the construction of the Norwich & Worcester Railroad, and later of the New Jersey Central Railroad. He built the wrought-iron bridge across the Connecticut River at Windsor Locks, which was one of the first of its kind in the United States. He was the first president of the American Society of Civil Engineers.

d. *March 16, 1875.*

EDWARD WESTON.

b. *May 9, 1850.*

d.

American electrician. He became chemist to the American Nickel-plating Company and introduced improvements in the art of nickel-plating. In 1873 he prepared the first copper-coated carbons. In 1875 he engaged in the manufacture of dynamo-electric machinery, establishing what is believed to be the first factory in this country which was devoted to that class of apparatus; in the same year he began experimenting in arc and incandescent lighting. In 1876 he constructed several incandescent lamps and since that time has steadily developed his systems of both these varieties of electric lighting. One of his most important inventions is that of tamidine, a modification of cellulose, which is extensively used in incandescent lamps.

*It is not in our power to appropriate to ourselves the experiences and results which the future alone can bring. But in a common sense we are enabled to prolong our life backward into the past by appropriating the experiences of those who were before us, and by becoming acquainted with their views as thoroughly as if we had been their contemporaries. The means of doing this is also an elixir of life.*

—HERMANN KOPP.

1841.—Mapes practiced electrotyping in New York.  
1855.—Electrotyping was in general use.

*Look down on earth.—What seest thou? Wondrous things!  
Terrestrial wonders that eclipse the skies.  
What lengths of labor'd lands! what loaded seas  
Loaded by man, for pleasure, wealth or war!  
Seas, winds, and planets, into service brought,  
His art acknowledged, and promote his ends.  
Nor can the eternal rocks his will withstand.  
O'er vales and mountains sumptuous cities swell,  
And gild our landscapes with their glittering spires.  
Some 'mid the wond'ring waves majestic rise;  
And Neptune holds a mirror to their charms.  
High through mid air, here streams are taught to flow;  
Whole rivers, there, laid by in basins, sleep.  
Here, plains 'turn oceans'; there, vast oceans join  
Thro' kingdoms channel'd deep from shore to shore;  
And chang'd creation takes its face from man.*  
—*Night Thoughts*: YOUNG.

1820, July 26.—Captain Brown completed the first chain bridge erected in Great Britain over the River Tweed—432 feet span, 27 feet high.

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MEMORANDA AND DIARY.

THOMAS YOUNG.

b. June 13, 1773.

d. May 10, 1829.

English physician and natural philosopher. He discovered the interference of the rays of light. He has been called the founder of physiological optics. He was the first to prove conclusively that the accommodation of the eye for vision at different distances was due to change of curvature of the crystalline lens. He first explained color sensation as due to the presence in the retina of structures which respond to the three colors, red, green and violet, respectively. He was the first to use the term "energy" for the product of a mass of a body into the square of its velocity, and the expression "labor expended" for the product of the force exerted on a body into the distance through which it is moved, and to state that these two products were proportional to each other. Young took the first difficult steps in the decipherment of the hieroglyphics of Egypt.

*If glorious structures and immortal deeds  
Enlarge the thought, and set our souls on fire,  
My tongue has been too cold in Egypt's praise,  
The queen of nations, and the boast of times,  
Mother of science, and the house of gods!  
Scarce can I open wide my labouring mind,  
To comprehend the vast idea, big  
With arts and arms, so boundless is its fame.*

—YOUNG.

AUGUSTIN JEAN FRESNEL.

b. May 10, 1788.

d. July 14, 1827.

French geometer and optician. He began to experiment on the theory of light about 1815. He performed for physical optics what Newton did for astronomy. His experiments tend to prove the truth of the theory that light consists of the vibrations of an elastic medium. His theory of double refraction and polarization is called one of the finest efforts of genius. He made the first successful application of lenses to the lamps of light-houses and invented the illuminating apparatus.

*I guide the train o'er the level plain,  
A swiftly nearing star,  
And I bend and swerve where the mountains curve  
My iron-bound path to bar.  
Up their rocky steep the fleet flame leaps,  
Or I flash in their depths below,  
Till the mosses that dress each dim recess,  
And the nodding ferns I show; gloom  
I spring to illumine the frowning gloom  
Of precipices gray,  
And waters smile from the deep defile  
In my momentary day.  
—The Song of the Headlight: HARDY JACKSON.*

1757.—John Dolland constructed an achromatic telescope without any knowledge of Hall's invention. He also made an important discovery concerning the aberration of light.

1759, October 1.—The Eddystone Lighthouse was rebuilt the second time by John Smeaton.

1811, February 1.—Bell Rock Lighthouse first lighted.

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MEMORANDA AND DIARY.

OTTO GUERICKE.

b. 1602.

d. May 11, 1686.

German inventor of the air-pump, about 1650, and of the copper hemispheres by which he illustrated the pressure of the atmosphere. He discovered that electricity was manifested by repulsion as well as by attraction. He, with Boyle, proved that a piece of rubbed amber, which attracted other bodies to itself, was in turn attracted by a body brought near it.

*At last the hour of light is here,  
And kings no more shall blind,  
Nor the bigots crush with craven fear*

*The forward march of mind;*

*The words of Truth and Freedom's rays*

*Are from my pinions hurt'd,*

*And soon the sun of better days*

*Shall rise upon the world.*

—*The Song of Lightning*: GEORGE W. CUTTER.

*Pretty! in amber to observe the forms*

*Of hairs, or straws, or dirt, or grubs, or worms;*

*The things, we know, are neither rich nor rare,*

*But wonder how the devil they got there.*

—*Epis. to Arbuthnot*: POPE.

640 B. C.—Thales discovered the electricity of amber.

1675.—Newton, Robert Boyle and others used glass in generating electricity.

1676.—Boyle published his electrical experiments.

1819.—Electro-magnetic action was discovered by Hans Christian Oersted, of Copenhagen.

1856.—Jules Duboscq's electric lamp was exhibited.

FREDERICK ALBERT WINSOR.

b. 1763.

d. May 11, 1830.

English promoter. A pioneer in gas-lighting. In 1802 he went to Paris to investigate thermo-lamps. He returned to England and commenced a series of lectures, but kept secret his method of procuring and purifying gas. On May 18, 1804, he obtained a patent for an improved oven, stove, or apparatus for the purpose of extracting inflammable air, oil, pitch, tar and acids, and reducing into coke and charcoal all kinds of fuel. In 1807 he lighted up part of a street which was the first instance of this kind of light in London. On February 20, 1807, he obtained a patent for a new gas furnace and purifier; his later patents are for refining gas so as to deprive it of all disagreeable odor during combustion. In 1815 he founded a gas company in Paris.

*And when, ah, Winsor!—distant be the day!—  
Life's flame no longer shall ignite thy clay;  
Thy phosphor nature, active still, and bright,  
Above us shall diffuse post obit light.*

*Perhaps, translated to another sphere,  
Thy spirit—like thy light, refined and clear—  
Ballooned with purest hydrogen, shalt rise,  
And add a patent planet to the skies.*

*Then some sage Sidrophel, with Herschel eye,  
The bright Winsorium Sidus shall decry;  
The Vox Stollarum shall reward thy name,  
And thine outline another Winsor's fame.*

—*Botanic Garden*: DR. DARWIN.



1904.

WEDNESDAY.

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MEMORANDA AND DIARY.

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EDME MARIOTTE.

b. 1620.

d. May 12, 1684. French mathematician and physicist. One of the earliest of French experimental philosophers. He discovered the law of elastic fluids called by his name, and the "Punctum Coecum" (blind spot in the eye), in 1666. Among his works are "Discourse on the Nature of Air" (1676); "Treatise on the Movement of Waters" (1690); and an "Essay on Logic."

*Physical force has no value where there is nothing else. Snow in snow-banks, fire in volcanoes and solfataras is cheap. The luxury of ice is in tropical countries, and midsummer days. The luxury of fire is, to have a little on our hearth; and of electricity, not valleys of the charged cloud, but the manageable stream on the battery wires. So of spirit, or energy; the rest or remains of it in the civil or moral man are worth all the cannibals in the Pacific.*

—Power: EMERSON.

83.—Philosophers were expelled, and their schools suppressed, by Domitian.

415.—Hypatia, an eminent woman mathematician, was killed and maimed by monks who were jealous of her great wisdom.

1546.—Blaise Pascal proved that the atmosphere had weight. 1700.—Newton was pronounced impious and heretical by his fellow philosophers for his views of gravitation.

1823.—The liquefaction of gases was discovered by Faraday.

JAMES EUGENE MUNSON.

b. May 12, 1835.

d.

American phonographer. Founder of the Munson system of stenography. With other reporters, he simplified the existing systems of shorthand and presented them in his "Complete Phonographer" (New York, 1866). He also invented a type-setting machine which, by means of a prepared ribbon of paper, automatically sets a column of corrected, justified and leaded type; also machines by which the ribbon is prepared. He also invented a telegraph operated by the same paper ribbon, which causes an exact fac-simile of the ribbon to be automatically produced at a distant point, ready for use in operating a similar type-setting machine. These inventions depend upon his "Selecting Device" which was patented by him.

*These lines and dots are locks and keys,  
In narrow space to treasure thought,  
Whose precious hoards, whene'er you please,  
Are thus to light from darkness brought.*

—Shorthand: JAMES MONTGOMERY.

*If we didn't have this toiling through the dreary, weary years—  
If we didn't have the heartaches, if we didn't have the tears,  
We might reap the rarest flowers that have blossomed in the dew—  
We might learn the sweetest lessons that they teach, who never knew!*

—FRANK L. STANTON.

1650.—First attempts at stenography were made.

1904.

THURSDAY,

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MEMORANDA AND DIARY.

CHARLES VON LINNÉ or LINNÆUS.

b. *May 13, 1707.* d. *January 10, 1778.*

Swedish naturalist. He was the constructor of the artificial system of classifying plants which bear his name. In the formation of natural groups much had been done by Aristotle, but the merit of first arranging these groups in orderly succession belongs to Linnæus. With animals he distinguished six sub-kingdoms : (1) Quadrupeds, or Mammalia ; (2) Birds ; (3) Amphibia ; (4) Fishes ; (5) Insects ; (6) Worms. In 1732 he made his journey to Lapland, where he collected unknown plants.

*Oh, what an endless work have I in hand,  
To count the sea's abundant progeny !  
Whose fruitful seed far passeth those on land,  
And also those which fill the azure sky !  
'Tis easier far to tell the stars on high,  
Although they endless seem in estimation,  
Than to recount the sea's posterity ;  
So fertile be the floods in generation,  
So vast their numbers, and so numberless their nation.*

—SPENSER.

*So print makes visible the unseen thought  
To pass away, the miracle being wrought.  
Life is an inner energy, unfurled  
In visible shows from an invisible world ;  
Still fed and fed from that almighty force  
Of which no science yet has grasped the source,  
Whose infant germ from the dead seed reborn,  
Is greater than a realm of ripened corn.*

—A Tale of Eternity ; GERALD MASSEY.

JAMES YOUNG.

b. *July 13, 1811.* d. *May 13, 1883.*

English chemist. Originator of the paraffine industry. On October 17, 1850, he took out a patent for the production of paraffine from the dry distillation of coal. The firm with which he was connected first manufactured naphtha and lubricating oils. He also devised a method of making sodium stannate direct from tin-stone.

*Whether the active sun, with chemic flames,  
Through porous earth transmits its genial beams ;  
With heat impregnating the womb of night,  
The offspring shines with its paternal light ;  
Or whether, urged by subterranean flames,  
The earth, fermented, and flows in liquid streams  
Purged from their dross, the nobler parts refine,  
Receive new forms, and with fresh beauties shine.*

—YALDEN.

*The Mohammedan says : " The ink of the learned  
is as precious as the blood of the martyrs,"*

—PHILLIPS BROOKS.

*Before you can get mental training, you must get  
a mind ; before you can learn to live well you must  
learn to live ; before one can become something, one  
must be something. " To him that hath," saith  
Jesus, " to him shall be given."*

—PHILLIPS BROOKS.

1848.—Paraffin was procured from mineral oil by James Young at Afreton in Derbyshire.

1850.—Paraffin was made by Karl von Reichenbach.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## GABRIEL DANIEL FAHRENHEIT.

b. May 14, 1686.

d. September 16, 1736.

Prussian merchant of Dantzic, celebrated for the improvements he introduced in the construction of thermometers and barometers. In the thermometer he substituted mercury for spirits of wine, and constructed the scale that still bears his name. The Fahrenheit scale has been adopted by three countries—Holland, Great Britain and the United States. He invented a machine designed to drain those parts of Holland which were exposed to inundations. In 1724 he published a dissertation on thermometers.

*And what if Trade sow cities*

*Like shells along the shore,*

*And thatch with towns the prairie broad*

*They are but sailing foam-bells*

*Along Thought's coursing stream,*

*And take their shape and sun-color*

*From Him that sends the dream.*

—*The World-Soul*; EMERSON.

1564.—Galileo discovered the pressure of the atmosphere to be 15 pounds to the square inch.

1583.—Galileo discovered the hydrostatic balance. In 1597 he made a thermometer.

1643.—Evangelista Torricelli, of Florence, discovered the principle of the barometer.

1834.—Thilorier succeeded in reducing a gas to a solid.

## WILLIAM EMERSON.

b. May 14, 1701.

d. May 20, 1782.

English mathematician and musician. Wrote numerous important works on mathematics, elementary and advanced. Was as eccentric as he was profound.

*All Nature is but Art, unknown to thee ;*

*All chance, direction which thou canst not see.*

*All discord, harmony not understood,*

*All partial evil, universal good.*

—POPE.

*Because I cannot flatter, and look fair,*

*Smile in men's faces, smooth, deceive, and cog,*

*I must be held a rancorous enemy.*

*Cannot a plain man live, and think no harm,*

*But thus his simply truth must be abus'd,*

*By sicken, sly, insinuating Jacks ?*

—*Richard III.* ; SHAKESPEARE.

330 B. C.—Aristoxenus discovered the difference between major and minor tones.

150.—Clandius Ptolemy taught that the major tone should be below the minor.

930.—Hucbald of Flanders invented a system of scales wherein the semitone was always between the second and third of a tetrachord.

1022.—Guido d'Arezzo, a monk, invented the system of musical notes.

1338.—The musical notes were perfected and arranged as in modern use.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

NEIL ARNOTT.

b. May 15, 1788.

d. March , 1874.

Scotch physicist; well known since 1827 for his "Elements of Physics"; also as the inventor of what is known as "Arnott's stove," and other important devices of great economical value, among them the "Arnott water bed," and the "Arnott ventilator," all of which he refrained from patenting.

*Go, wondrous creature! Mount where science guides,  
Go, measure earth, weigh air and taste the tides,  
Instruct the planets in what orbs to run,  
Correct old time and regulate the sun;  
Go, soar with Plato to th' empyreal sphere,  
To the first good, first perfect and first fair;  
Or tread the mazy round his followers trod,  
And quitting sense, call imitating God;  
As eastern priests in giddy circles run,  
And turn their heads to imitate the sun.*

—Essay on Man: POPE.

*The clouds may drop down titles and estates;  
Wealth may seek us, but wisdom must be sought;  
Sought before all, but (how unlike all else  
We seek on earth!) 'tis never sought in vain.*

—Night Thoughts: YOUNG.

38.—Seneca noted gravitation as an innate power; also the attraction of tides by the moon.

280 —The first treatise on optics was written by Euclid.

1629.—Van Helmont introduced the term gas.

1670.—Huygens introduced the theory of oscillation.

1714.—Newton explained the correct theory of fluids and the oscillation of waves.

ROBERT HARE.

b. January 17, 1781.

d. May 15, 1858.

American scientist, who discovered the oxygen blow-pipe in 1801, which he called a "hydrostatic blow-pipe." He first fused lime, magnesia, iridium, and platinum in any considerable quantity, and the so-called Drummond and calcium lights are simply applications of the principles discovered by him. He invented the valve-cock or gallows-screw; in 1816 he invented the calorimeter. He was the author of a process for denarcotizing laudanum, and also a method for detecting minute quantities of opium in solution.

*I value Science—none can prize it more,  
It gives ten thousand motives to adore;  
What time it lays the breast of Nature bare,  
Discerns God's fingers working everywhere;  
In the vast sweep of all embracing laws,  
Finds Him the real and the only Cause;  
And, in the light of clearest evidence,  
Perceives Him acting in the present tense;  
Not as some claim, once acting but now not,  
The glorious product of His hands forgot—  
Having wound up the grand automaton,  
Leaving it, henceforth, to itself to run.*

—Christian Science: ABRAHAM COLES.

*What cannot art and industry perform,  
When science plans the progress of their toil!*

—Minstrel: BEATTIE.

1830.—Thomas Drummond introduced the lime light.



1904.

SUNDAY.

1904.

MEMORANDA AND DIARY.

## WILLIAM CONGREVE.

b. May 20, 1772.

d. May 16, 1828.

English engineer. Inventor of the rocket named after him. These celebrated rockets were first used against Boulogne in 1806, and were subsequently employed with great effect in the Basque roads, at Walcheren, in the peninsula campaigns, at Leipzig, and in the attack upon Algiers, and have long been in permanent use in military and naval tactics. He published in 1812 an "Elementary Treatise on the Mounting of Naval Ordnance," and in 1815 a "Description of the Hydro-Pneumatic Lock."

*Uzziah prepared . . . shields, and spears, and helmets, and habergeons, and bows, and slings to cast stones. And he made in Jerusalem engines, invented by cunning men, to be on the towers and upon the bulwarks, to shoot arrows and great stones withal. And his name spread far abroad; for he was marvellously helped, till he was strong.*

—2 Chronicles, chapter 26.

*Though a soldier in time of peace is like a chimney in summer, yet what wise man would pluck down his chimney because his almanack tells him 'tis the middle of July?*

—HUGHES.

937 B. C.—Jason invented breast-plates.

757.—The Chinese claim to have first used artillery at the defense of Taiguen.

1640.—The bayonet was invented at Bayonne.

1693.—Bayonets were used at the Battle of Turin.

## JOHN WEBSTER COCHRAN.

b. May 16, 1814.

d.

American inventor. In 1833 he patented a steam-heating apparatus; in 1834 he invented a revolving breech-loading rifled cannon, in which the cylinder was automatically rotated by the cocking of the hammer. He was engaged in the manufacture of firearms and projectiles. He invented machinery for the curvilinear sawing of timber.

*Yet reason frowns in war's unequal game,  
Where wasted nations raise a single name;  
And moritogad states their grand sire's wreaths regret,  
From age to age in everlasting debt;  
Wreaths which at last the dear-bought right convey  
To rust on medals or on stones decay.*

—Vanity of Human Wishes; Dr. JOHNSON.

1430.—Gester invented an air-gun at Nuremberg, Bavaria.

1733-1800.—Jean Claude Lemiceaud D'Arcon lived. In 1780 he invented the floating batteries which were intended to reduce Gibraltar. They failed, but not by his fault. He is the author of several works on his profession.

1827.—The needle-gun was invented by Johann N. Dreyse, of Soemmerda.

1851, February 3.—Charles Adiel L. Totten was born. In 1877 he patented explosives, collimating sights, and signal-shells; in 1884, a system of weights and measures; and in 1885 a linear scale.

1860.—Spencer repeating rifle was patented.

1861.—Henry rifle, firing 15 shots before reloading, was patented.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

JOSEPH NORMAN LOCKYER.

b. May 17, 1836.

d.

English astronomer. About 1860 he began telescopic and spectroscopic observations of the sun, and in 1866 proposed a method for observing the red flames without an eclipse. He has communicated many memoirs to the Royal Society on the dissociation of the terrestrial elements in the sun, the spectra of sun spots, a revision of Kant's hypothesis on the origin of celestial bodies, the spectra of meteorites, the classification of stars as determined by their spectroscopic phenomena when photographed on a large scale, and on the origin of new and variable stars. He published "The Spectroscope and Its Applications" (1873), and "The Sun's Place in Nature" (1897).

*But this man  
Left behind him projects large,  
Schemes of progress undeveloped,  
Worthy of a nation's charge;  
Noble fancies uncompleted,  
Germs of beauty immatured,  
Only needing kindly feeding  
To have flourished and endured;  
Meet reward in golden store  
To have lived for evermore.*

1897, March 17. — A large spot on the sun was observed. 1826-60. — Heinrich S. Schwabe proved the periodicity of sun-spots. He discovered that a cycle of changes in the number of sun-spots occurred in 11 years.

FREDERICK AUGUSTUS GENTH.

b. May 17, 1820.

d.

1893.

German chemist. He was an assistant to Prof. Bunsen, and his name is associated with the ammonia cobalt bases which he discovered in 1846. He is the author of one hundred separate papers on subjects in chemistry and mineralogy.

*All manners take a tincture from our own,  
Or some discolor'd through our passions shown;  
Or fancy's beam enlarges, multiplies  
Contracts, inverts and gives ten thousand dyes.*

—POPE.

*All generous companies of artists, authors, philanthropists, men of science, are, or ought to be, Societies of Mutual Admiration. A man of genius, or any kind of superiority, is not debarred from admiring the same quality in another, nor the other from returning his admiration.*

—The Autocrat; HOLMES.

*Could he, whose rules the rapid comet bind,  
Describe or fix one movement of his mind?  
Who saw its fires here rise, and there descend,  
Explain his own beginning, or his end?  
Alas! what wonder! man's superior part  
Uncheck'd may rise, and climb from art to art:  
But when his own great work is but begun,  
What reason weaves, by passion is undone.*

—POPE.

1786. — Berthollet invented muriatic powder. 1812. — Iodine was discovered by M. De Courtois, a manufacturer of salt-peter.

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MEMORANDA AND DIARY.

BERNARD ZENDRINI.

b. April 7, 1679.

Italian mathematician; celebrated for his skill in hydraulics. He was appointed chief hydraulic engineer at Ferrara, and afterwards was made the superintendent of all the waters, rivers and ports of the Venetian republic. He was also employed by the Austrian Government and the republic of Lucca. Many works of great importance were executed by him.

*When cannot art and industry perform,  
When science plans the progress of their toil  
They smile at penury, disease and storm;  
And oceans from their mighty moulds recoil.  
'Tis he alone, whose comprehensive mind,  
From situation, temper, soil and clime  
Explor'd, a nation's various pow'rs can bind,  
And various orders, in one form sublime  
Of polity, that midst the wrecks of time,  
Secure shall lift its head on high, nor fear  
Th' assault of foreign or domestic crime,  
While public faith, and public love sincere,  
And industry and law maintain their sway severe.*  
—BEATTIE.

97.—Sextus Julius Frontinus made Water Commissioner of Rome.

1698.—Thomas Savery invented an engine for raising water; patented July 25, 1698.

1801.—Water-pipes were first laid in United States in Philadelphia.

1842.—Croton Aqueduct, New York, was completed.

JOHN GEORGE CHILDREN.

b. May 18, 1777.

d. January 1, 1852.  
English chemist and electrician. He discovered a method of extracting silver from its ore without amalgamation. On July 2, 1813, he put in action the largest galvanic battery then constructed.

*This night I'll change  
All that is metal in thy house to gold;  
And early in the morning will I send  
To all the plumbers and the pewterers,  
And buy their tin and lead up; and to Lothberry  
For all the copper.  
Yes, and I'll purchase Devonshire and Cornwall,  
And make them perfect Indies.*  
—Johnson's Alchemist.

*You disjoin, unite, condense, expand,  
And give new wonders to the Chemist's hand;  
On tepid clouds of rising steam aspire,  
Or fix in sulphur all its solid fire;  
With boundless spring elastic airs unfold,  
Or fill the fine vacuities of gold;  
With sudden flash vntrescent sparks reveal,  
By fierce collision from the flint and steel.*  
—Botanic Garden; DR. DARWIN.

1913 B. C.—Gold and silver money was first mentioned.

266 B. C.—Silver was coined as money.

684.—The first Arab coin was issued.

807.—Paper money was used.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## WILLIAM HENRY.

b. *May 19, 1729.*

American inventor. In 1768 he invented the "self-moving or sentinel register," which was followed in 1771 by the "screw-auger." He was among those antecedent to Fitch and Fulton in the application of steam as a motive power to propel boats. In 1785 he exhibited the "model of a wheel-carriage, which rolls close in to the wind by wind-force."

*Ha, ha, ha! they have found me at last;*

*They invited me forth at length,*

*And I rushed to my throne with a thunder-blast,*

*And I laugh'd in my iron strength!*

*Oh! then ye saw a wondrous change*

*On the earth and ocean wide,*

*Where now my fiery armies range,*

*Nor wait for wind and tide.*

*The ocean pales where'er I sweep,*

*To hear my strength rejoice.*

*And the monsters of the briny deep*

*Cower, trembling at my voice.*

*I carry the wealth and the lord of earth,*

*The thoughts of his godlike mind;*

*The wind lags after my flying forth,*

*The lightning is left behind.*

— *The Song of Steam*; GEORGE W. CUTTER.

1788.—John Fitch, a clockmaker, built a steamboat that ran several times from Philadelphia to Burlington and Trenton. He was abandoned by his supporters and ended his life by plunging into the Alleghany River, having been driven to insanity by unbelievers.

## JOSEPH CLEMENT.

b. 1779. d. 1844.

English machinist. He devoted himself to the improvement of self-acting tools, especially the slide lathe. He invented a screw engine lathe, with gearing mandrel and sliding table wheel-work, by means of which he first cut the inside screw tools from the left-handed hobs; while in shaping machines he was the first to use the revolving-cutter attached to the slide-rest. Among his other inventions in screws is his headless tap. He also invented a planing machine by means of which metal plates of large dimensions were planed with perfect truth and accuracy. He was an expert draughtsman and invented an instrument by means of which ellipses of all proportions as well as circles and right lines might be geometrically drawn on paper or on copper.

*Tools and man I sing.*—CARLYLE.

*The true Epic of our times is, not Arms and the Man, but Tools and the Man—an infinite wider kind of Epic.*

—CARLYLE.

*"I'm for plain, practical realities!"*

*That is your cry; "I'm for the working man!"*

*Well, for my part I'm for the thinking man,*

*The man who stands behind the working man*

*And orders him so that his work is good.*

— *Vox Populi, Vox Dei*; 146 BLACKWOOD'S MAGAZINE.

879 (1889).



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THURSDAY.

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MEMORANDA AND DIARY.

## EMILE BERLINER.

b. May 20, 1851.

d. German inventor and electrician. In 1875 he studied physics and experimented with the telephone. Early in 1877 he elaborated the principle of loose electrical contacts to be applied to the telephone, this being the principle on which the microphone and modern telephone transmitters are based. He was the first to suggest the use of an induction coil for telephony, and the first to discover that a loose contact transmitter will act as a receiver instead of a Bell telephone. He brought to perfection the well-known Blake transmitter, for many years the standard instrument of the Bell Telephone Company. In 1887 he invented the gramophone, in which sound is etched into zinc or other substances and may be preserved and duplicated *ad infinitum* in hard rubber or celluloid.

*Therefore, if any young man here have embarked his life in pursuit of knowledge, let him go on without doubting or fearing the event; let him not be intimidated by the cheerless beginnings of knowledge, by the darkness from which she springs, by the difficulties which hover around her, by the wretched habitations in which she dwells, by the want and sorrow which sometimes journey in her train, but let him ever follow her as the angel that guards him, and as the genius of his life.*

—SYDNEY SMITH.

## CHRISTOPHER COLUMBUS.

b. about 1445.

d. May 20, 1506.

Italian discoverer of the variation of the mariner's compass, in 1492. He meditated the discovery of a western route to India in 1474, and August 3, 1492, he sailed from Palos with three vessels. October 12, 1492, he discovered the island of San Salvador, returning to Palos March, 1493. In the autumn of that year he made a second voyage and discovered Jamaica, Porto Rico and other islands. In 1498 he made a third voyage and discovered Paria, on the continent, and in May, 1502, he made a fourth voyage. He died in poverty and neglect.

*Chains thy reward! beyond the Atlantic wave,  
Hang in thy chamber, buried in thy grave.*

—SAMUEL ROGERS.

*Whatever can be known of earth we know,  
Sneered Europe's wise men, in their snail-shells curled;  
No! said one man in Genoa, and that No  
Out of the dark created this New World.*

*No kindly conqueror, since time began  
The long career of ages, hath to man  
A scope so ample given for trade's bold range  
Or caused on earth's wide stage such rapid, mighty change.*

—CHRISTOPHER COLUMBUS; JOANNA BAILEY.

1494.—Columbus discovered Isle of Pines.

1498.—Columbus discovered Trinidad.

1500.—Columbus was a prisoner to Spain.

1795.—Columbus' body was removed to Cuba.

1904. FRIDAY. 1904.

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MEMORANDA AND DIARY.

WILLIAM NICHOLSON.

1753.

d. May 21, 1815.

b.

English scientist and inventor. Invented the aerometer, and discovered the chemical action of the galvanic pile. On April 29, 1790, he patented a machine for printing on linen, cotton and other fabrics by type fastened on a cylinder, cylindrical inking-rollers and two cylinders working concurrently and printing a sheet of paper passed between them. It appeared from the patent that the inventions were adapted to calico printing and paperhangings, as well as to the printing of books, but they were never used for those purposes.

*Slow spread the secret art, its use was slow;  
Whate'er the improvements later times bestow,  
Still how restrain'd, how circumscribed its power!  
Years raise the fruit an instant may devour.  
Fond Science wept; the uncertain toil she view'd,  
And in the evil, half forgot the good.  
What though the sage, and though the bard inspired,  
By truth illumined, and by genius fired,  
In high discourse the theme divine prolong,  
And pour the glowing tide of lofty song.*  
—To Dr. Darwin; E. H. SMITH.

*There is always room for a man of force, and he makes room for many. One of the illusions is that the present hour is not the critical, decisive hour. Write it on your heart that every day is the best day in the year. He has not learned the lesson of life who does not every day surmount a fear.*

—EMERSON.

CHARLES EDWIN BESSEY.

b. May 21, 1845.

d.

American botanist. In 1884 he was called to the chair of botany in the State University of Nebraska, where he has developed a department of botany which ranks among the best in this country. He is the author of several text-books, including "Botany for High Schools and Colleges" (1880, 1888) and "Essentials of Botany" (1884).

*Beyond all estimate the truth here stored,  
Beyond all praise the toiling minds, who earn  
Its honors and who coin the massive hoard.  
But what the College knows the youth must learn;  
Not how to estimate or to discern  
Things independently. Correct and slow,  
Bordered by banks of stone, direct and stern  
As a canal, from centuries ago,  
Its stream of thought flows on, as ever taught to flow.*

—Alwyn; JAMES C. MOFFAT.

*Passions, like elements, though born to fight,  
Yet mix'd and softened, in his work unite;  
These 'tis enough to temper and employ;  
But what composes man, can man destroy:  
Suffice that reason keep to nature's road,  
Subject, compound them, follow her and God.  
Love, hope and joy, fair pleasure's smiling train,  
Hate, fear and grief, the family of pain;  
These mix'd with art, and to due bounds confin'd,  
Make and maintain a balance of the mind;  
The lights and shades, whose well-accorded strife  
Gives all the strength and color of our life.*

—Essay on Man; POPE.

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MEMORANDA AND DIARY.

WILLIAM STURGEON.

b. May 22, 1783.

d. December 4, 1850.

English electrician. His practical inventions covered the whole field of electrical science. In 1825 he presented to the Society of Arts an improved apparatus for electro-magnetic experiments, including his first soft-iron electro-magnet. To him is undoubtedly due the credit of being the original discoverer, he having constructed electro-magnets in soft iron as early as 1823. He first described (1830) the process of amalgamating the zinc plate of a battery with a film of mercury. In 1832 he constructed the first electro-magnet rotary engine.

*Who could its victories count, its powers, its pride?*

*Its deeds, discoveries? How its children tore  
Secrets from all those glooms where the gnomes hide*

*The subtle spells of many a cosmic lore?*

*Who could its scroll exhaust, naming each name  
Of brave, wise, mighty men that brought its fame?*

—*The Last Christmas of the Century*; SIR EDWIN ARNOLD.

1819.—Oersted discovered the magnetic action of an electric current.

1821.—Michael Faraday discovered the action of an electric current on the magnetic needle.

1842.—Magneto-electricity was applied to electroplating by Woolwich.

1882, October 25.—J. E. H. Gordon's great dynamo machine was exhibited at Woolwich.

CHARLES H. HASWELL.

b. May 22, 1809.

d.

American engineer. In 1837 he designed and built the first practical steam launch, the "Sweet-heart." In 1847-1848 he designed the entire engine and boiler equipment of the United States frigate "Powhatan." The engines were set in wrought-iron frames—the first construction of its kind. He designed and located the buildings on Hoffman Island, in lower New York Harbor, the crib bulk-head at Hart's Island and the foundations of several large buildings of New York City. He was the first to use zinc in marine steam-boilers and in the hold of vessels to prevent the injurious effect of galvanic action of salt water and copper on the iron, by its action on the zinc. He is the author of "Haswell's Engineer's and Mechanic's Pocket Book."

*Hard Steel succeeded then;  
And stubborn as the metal were the men.*

\* \* \* \* \*  
*Then sails were spread to every wind that blew,  
Raws were the sailors, and the depths were new;  
Trees, rudely hollow'd, and the waves sustain,  
Ere ships in triumph plough'd the wat'ry plain.*

—*Ovid's Metamorphoses*.

1807.—The first steamboat to navigate the Hudson, the "Clermont," was built by Fulton, the trip occupying thirty-two hours. Fulton thus obtained the exclusive use of the river for steamboats.

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MEMORANDA AND DIARY.

## JAMES BUCHANAN EADS.

b. May 23, 1820.

d. March 8, 1887.

American civil engineer. He invented a diving-bell boat for recovering the cargoes of sunken steamers; then introduced powerful pumping machinery to exhaust the water and sand. He constructed a flotilla of eight iron-plated gunboats, also six turreted and heavy-plated iron ships. The St. Louis Bridge was designed under his supervision and completed in 1874. His most important work was the formation of a permanent channel at the mouth of the Mississippi River, which was deepened by means of "jetties."

*Lead by the Sage, lo ! Engineers shall guide*

*Huge Sea-Balloons, beneath the tossing tide ;*

*The diving castles, roof'd with spheric glass,*

*Bubb'd with strong oak, and barr'd with bolts of brass,*

*Buoy'd with pure iron shall endless tracts pursue,*

*And Priestley's hand the vital flood renew.*

—*Botanic Garden*; DR. DARWIN.

325 B. C.—Aristotle first mentioned the use of diving-bells.

320 B. C.—He wrote the first treatise on mechanics.

1658.—The cannon engine for raising ships was invented by Baker, a Dutchman.

W. H. James invented a diving dress operated without the aid of a diving-bell or air-tube.

Phipps first introduced the diving-bell in England.

## WILLIAM DRAPER ANDREWS.

b. May 23, 1818.

d.

1896.

American inventor. In 1844 he invented the pioneer centrifugal pump, which was patented in 1846. A few years later he invented and patented the anti-friction centrifugal pump, and also three other distinct styles and patterns of centrifugal pumps, of which that known as the "Cataract" is the most valuable. In all he has received twenty-five United States and nine foreign patents on pumps, oscillating steam-engines, boilers, friction and differential power gearing, siphon gang-wells and attachments, balanced valves, safety elevators and other similar inventions.

*And here and there upon the air*

*Roll back great clouds of smoke,*

*Which tell of labor's busy scene,*

*The engine's ceaseless stroke,*

*The whirl of wheels, the buzz of saw,*

*The varied notes of toil—*

*Industry's anthem, Labor's song,*

*A symphony of toil.*

—*Over the City's Tops*; BUFFALO EVENING NEWS.

The ordinary lift-and-force pump was known to antiquity. 1849.—M. Morin showed that from 55 to 82 per cent. of power was wasted in pumps.

1851.—Centrifugal pumps were generally adopted.

1862.—Duplex pumps exhibited by Farcot.

1871, May 9.—Green patented his driven well.



MONDAY.

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MEMORANDA AND DIARY.

WILLIAM CHAUVENET.

b. May 24, 1820.

d. December 13, 1870.

American mathematician. He was very active in the movement that led to the establishment of the U. S. naval academy at Annapolis, Md. He was a member of several scientific societies. Besides several contributions to the "American Journal of Science," "Proceedings of the American Association for the Advancement of Science," "Gould's Astronomical Journal," and the "Mathematical Monthly," he was the author of text books on "Trigonometry" (1850), and "Geometry" (1870).

*So he lived. At last I missed him;  
Still might evening twilight fall,  
But no taper lit his lattice—  
Lay no shadow on his wall.  
In the winter of his seasons,  
In the midnight of his day,  
Mid his writing and inditing,  
Death had beckoned him away,  
Ere the sentence he had planned  
Found completion at his hand.*

1795.—Union College was incorporated.

1802.—West Point Military Academy was founded.

1824.—Rensselaer Polytechnic Institute was organized.

1845.—The U. S. Naval Academy was established at Annapolis, Md.

These institutions are the oldest engineering schools.

MORRIS LONGSTRETH KEEN.

b. May 24, 1820.

d. November 2, 1883.

American inventor. With his brother he established a foundry in West Philadelphia for the manufacture of flat-irons on a new principle of his own invention. He gave his attention to the making of paper out of wood and attained the result by boiling under pressure. His discovery has completely revolutionized the art of paper making and reduced the cost of paper to about one-fourth the original price.

*Sad o'er the scattered ruins Genius sighed,  
And infant Arts but learned to weep and died.  
Till to astonished realms Papyrus taught  
To paint in mystic colours sound and thought,  
With Wisdom's voice, to print the page sublime  
And mark in adamant the steps of time.*

—Botanic Garden; Dr. DARWIN.

*The talent of success is nothing more than doing  
what you can do well, and doing well whatever you  
do without a thought of fame.*

198 B. C.—Attalus, founder of the monarchy of Pergamus, invented parchment.

16 B. C.—Paper was made from the inner bark of trees (bast). 95.—Linen paper was invented. 648.—Cotton paper was introduced. 1253.—Paper was manufactured from linen rags. 1720.—Paper was made from asbestos.

1860.—Henry Voelter invented an apparatus for grinding soft wood into pulp for the manufacture of paper.

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MEMORANDA AND DIARY.

JOHN SMEATON.

b. May 25, 1724.

d. October 28, 1792.

English civil engineer. Builder of the Eddystone lighthouse. The work of levelling the rock and preparing the dovetails for the lowest range of stone-work for his lighthouse was begun July 31, 1756, and on June 12, 1757, the first stone of the edifice was laid. On September 16, 1759, the frame of the lantern was fixed in its place, and on the 18th gilded ball surmounting the whole was screwed on by Mr. Smeaton himself. He planned and attended the execution of the great canal in Scotland. In 1751 he invented a machine to measure a ship's way at sea; also a compass of peculiar construction. He made two voyages to ascertain the merit of his contrivances. At a very early age he forged his own iron and steel and melted his own metal.

*Wrong ever builds on quicksands, but the right  
To the firm centre lays its moveless base.*

—Prometheus: LOWELL.

*As in a building  
Stone rests on stone, and wanting the foundation  
All would be wanting, so in human life  
Each action rests on the foregone event,  
That made it possible, but is forgotten  
And buried in the earth.*

—Michael Angelo: LONGFELLOW.

Smeaton's design of the base of the Eddystone light-house was taken from the bole or stump of a tree.

BARTOLOMEO AMMANATI.

b. 1511.

d. 1592.

Florentine architect and sculptor. He imitated Michael Angelo in sculpture. He designed the court and facade of the Roman College for Pope Julius III. At Florence he constructed the noble bridge called Ponte della Trinita, finished the Pitti Palace and erected several monuments. Among his chief works are three statues which adorn the tomb of the Sannazar at Naples, and a colossal statue of Neptune at Florence. He left a valuable work on buildings, etc., entitled "The City."

*Emblem of Rome! from power's meridian hurried,  
Yet claiming still the homage of the world,  
What had'st thou been, ere barbarous hands defaced  
The work of wonder, idolized by taste?  
Oh! worthy still of some divine abode,  
Mould of a conqueror! ruin of a god!*

—MRS. HEMANS.

*Four courts I made, east, west, and south, and north;  
In each a squared lawn, wherefrom  
The golden gorge of dragons spouted forth  
A flood of fountain foam.*

*And round the cool green courts there ran a row  
Of cloisters, branched like mighty woods,  
Echoing all night to that sonorous flow  
Of spouted fountain floods.*

—On Building: BACON.

1764, June 18.—Lighthouse at Sandy Hook first put in operation.

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MEMORANDA AND DIARY.

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## RICHARD CHRISTOPHER CARRINGTON.

b. May 26, 1826.

d. November 27, 1875.

English astronomer. He fixed the true period of the sun's rotation, traced the laws of distribution of maculae and investigated the existence of permanent surface currents. His work, "Observations of the Spots on the Sun," revolutionized ideas on solar physics. His determinations of the elements of the sun's rotation are still of standard authority.

*Prime cheerer, Light!*

*Of all material beings first and best!  
Efflux divine! Nature's resplendent robe!  
Without whose vesting beauty all were wrapt  
In unessential gloom; and thou, O Sun!  
Soul of surrounding worlds! In whom best seen  
Shines out thy Maker! May I sing of thee?*

—THOMSON.

*'Tis by thy secret, strong, attractive force,  
As with a chain indissoluble bound,  
Thy system rolls entire; from the far bourne  
Of utmost Saturn, wheeling wide his round  
Of thirty years, to Mercury, whose disk  
Can scarce be caught by philosophic eye,  
Lost in the near effulgence of thy blaze.*

—Summer; JAMES THOMSON.

1814, January 13.—Chester Smith Lyman was born. He invented the combined zenith telescope and transit for latitude, longitude and time, in 1832; in 1867 an apparatus for illustrating the dynamics of ocean waves; and in 1871, one for describing acoustic curves. He made improvements in clock escape-mechanisms, compensating pendulums and similar apparatus. He first observed the planet Venus as a delicate luminous ring when seen in close proximity to the sun.

## WASHINGTON AUGUSTUS ROEBLING.

b. May 26, 1837.

d.

Rensselaer Poly. Inst., 1857.

American civil engineer, son of John Augustus. Began his professional work on the Alleghany suspension bridge. He studied pneumatic foundations before sinking those of the East River Bridge, to the charge of which he was called after the death of his father but before any of the details had been determined. He continued in charge until its completion in 1883. The structure was the longest suspension bridge in the world and cost about \$13,000,000. Besides various pamphlets on professional subjects, he is the author of "Military Suspension Bridges" (Washington, 1862).

*Whoever amidst the sons  
Of reason, valor, liberty and virtue  
Displays distinguished merit is a noble  
Of nature's own creating.  
That life is not an idle ore,  
But iron dug from central gloom,  
And heated hot with burning fears  
And dipp'd in baths of hissing tears,  
And battered with the shocks of doom  
To shape and use.*

1855, March 14.—Niagara suspension bridge was first crossed.  
1883.—New York and Brooklyn Bridge was formally opened.  
1903, July 11.—Charles Cyril Martin, assistant engineer  
New York and Brooklyn Bridge, died.

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MEMORANDA AND DIARY.

SAMUEL WETHERILL.

b. May 27, 1821.

American inventor; pioneer manufacturer of zinc. He made the first "zinc white" in the United States and was the first to experiment with white oxide of zinc as a substitute for white lead. In 1852 he invented the "furnace process," and the tower process of separating the solid impurities. In 1853, with others, he formed a zinc company, and erected works in Bethlehem, Pa., to reduce the zinc ores of Lehigh County. In 1853 these works made the first "zinc white" in the U. S. by Wetherill's process in combination with the bag process of collecting, invented by Samuel T. Jones. He used vertical retorts for the manufacture of zinc spelter, which he patented. He made the first ingot in the U. S. from which sheet zinc was rolled in 1857.

*There are foam-embroidered oceans,  
There are little weed-clad rills,  
There are feeble, inch-high saplings,  
There are cedars on the hills.  
God, who counts by souls, not stations,—  
Loves and prospers you and me,  
For to Him, all jamed distinctions  
Are as pebbles in the sea.*

—A Man's a Man for a' That.

1821.—July 6 Henry Hussey Vivian was born. He was a metallurgist, and introduced the manufacture of spelter and the extraction of silver and gold from copper.

DARIUS WELLS.

b. April 26, 1800.

d. May 27, 1875.

American inventor and newspaper publisher, who, being satisfied of the advantages of wood type, invented the "routing machine," a vertical revolving cutler for the more speedy removal of the wood, and engaged in the business of furnishing wooden type and preparing boxwood for engravers.

*Again long ages mark the flight of time,  
And lingering toil evolves the Art divine.*

*Next, barbarous forms the mycetic sense conceal'd;  
Capricious the meaning, then, disclose;  
And, last, the infant alphabet arose;  
From Nilus' banks adventurous Cadmus errs,  
And on his Thebes the peerless boon confers.*

—E. H. SMITH.

*Urgent and masterful ashore,  
Man dreams and plans, and more and more,  
As ages slip away, earth shows  
How need by satisfaction grows,  
And more and more its patient face  
Mirrors the driving human race.*

—EDWARD S. MARTIN.

1593.—First newspaper was printed in England.

1704.—First newspaper was printed in America.

1790-1871.—Augustus Applegath lived. He invented machines for printing. About 1846 he constructed a rotary vertical machine for printing the London "Times." This machine was superseded by that of Richard M. Hoe, of New York.



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MEMORANDA AND DIARY.

JEAN LOUIS RODOLPHE AGASSIZ.

b. May 28, 1807.

d. December 14, 1873.

Swiss-American philosopher, physician and naturalist. In 1865 he explored the lower Amazon, studying its natural history, geology, etc. He discovered more than 1,800 new species of fishes in that region. He advanced new and remarkable ideas on geology and the agency of glaciers in his works "Études sur les Glaciers" (1840), and "Système Glacière" (1847).

*But the left spinners of the brain,  
Who love each added day and find it gain,  
Them overtakes the doom  
To snap the half-grown flower upon the loom  
(Trophy that was to be of life-long pain),  
The thread no other skill can ever knit again.  
'Twas so with him, for he was glad to live,  
'Twas doubly so, for he left work begun;  
Could not this eagerness of Faith, for gave  
Till all the allotted fax were spun?*

—AGASSIZ; LOWELL.

*Who taught the nations of the field and wood  
To shun their poison, and to choose their food?  
President, the tides or tempests to withstand,  
Build on the wave, or arch beneath the sand?  
Who made the spider parallel design,  
Sure as De Moivre, without rule or line?  
Who bid the stork, Columbus-like, explore  
Heav'n's not his own, and world's unknown before?  
Who calls the council, states the certain day?  
Who forms the phalanx, and who points the way?  
—Essay on Man: POPE.*

GEORGE M. TOTTEN.

b. May 28, 1809.

d. June 8, 1884.

American civil engineer. He began work on the Farmington Canal in 1827, and was subsequently employed upon the Juniata Canal and on a number of railroads. In 1843 he was appointed engineer-in-chief of the Canal del Dique, which connects Magdalena River with the harbor of Carthagena, Colombia. In 1850 he was engineer-in-chief of the Panama Railroad and spent twenty-five years among difficulties of every sort in the completion of this arduous task. He was afterwards its consulting engineer.

*Then temples rose, and towns, and marts,  
The shop of toil, the hall of arts;  
Then flew the sail across the seas  
To feed the North from tropic trees;  
The storm-wind wove, the torrent span,  
Where they were bid the rivers ran;  
New staves fulfilled the poet's dream,  
Galvanic wire, strong-shouldered steam.*

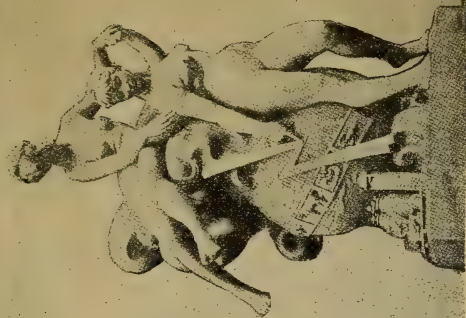
—EMERSON.

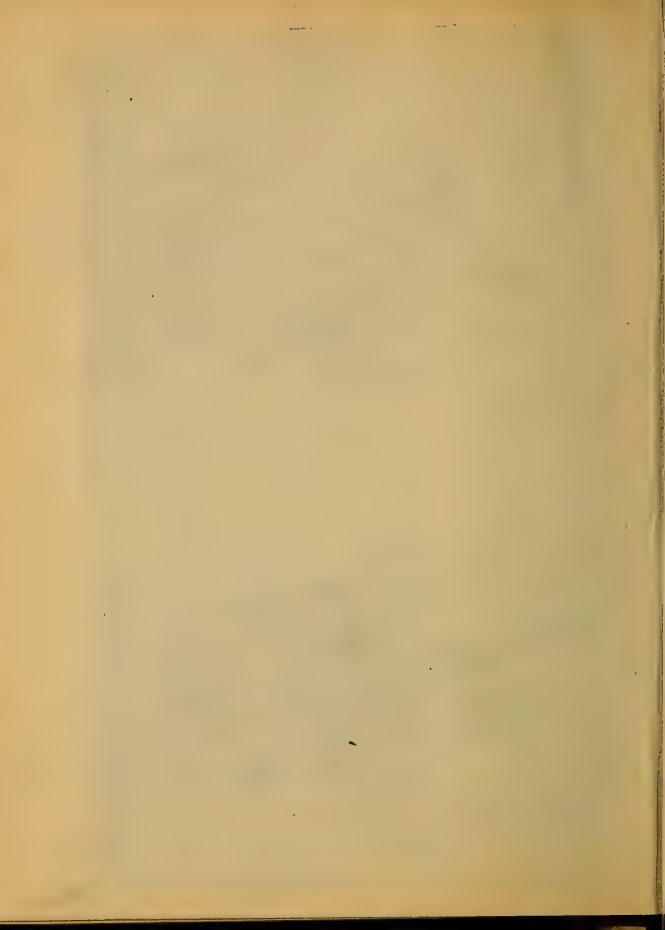
1855.—First train was sent over Panama Railway.

1873, July 23.—A railway connecting Mexico and Vera Cruz was opened.

1884.—Work was commenced on the Interoceanic Railroad.

1885, December 27.—Work was begun on a railroad to connect La Antigua with the Central Railroad of Guatemala.





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MEMORANDA AND DIARY.

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HUMPHRY DUTTON.

b. May 29, 1675.

d. October 15, 1715.

English mathematician. On the recommendation of Sir Isaac Newton he became mathematical master at Christ's Hospital. In conjunction with Whiston, he formulated a scheme for discovering longitude. The plan was laid before the Board of Longitude and was rejected, though applied to determine the distance between Paris and Vienna. He published "The Institution of Fluxions" and other works.

*A modest song and plainly told—  
The text is worth a mine of gold ;  
For many men most sadly lack  
A noble stiffness in the back.  
Walk yourself with firmer bearing,  
Throw your moral shoulders back,  
Show your spine has nerve and marrow—  
Just the thing which others lack.  
A stronger word was never heard  
In sense and tone than this—Backbone.*

—Backbone.

*When great Galileo proclaimed that the world  
In a regular orbit was ceaselessly whirled,  
And got not a convert for all of his pains,  
But only derision, and prison and chains,—  
"It moves, for all that!" was his answering tone ;  
For he knew, like the earth, he could "go it alone!"*

—J. G. Saxe.

1860, August 28.—James Nasmyth observed the lenticular-shaped objects on the sun called "willow-leaves," or "rice-grains."

LOUIS JEAN MARIE DAUBENTON.

b. May 29, 1716.

d. December 31, 1800 (1799).

French naturalist. Discovered a method of refining the fleece of sheep, and invented a micrometer for measuring the most delicate wool.

*Awakened spring weaves in her mystic loom,  
An azure sky, a soft caressing wind,  
The song of birds, the glint of streams combined  
With perfumed promises of summer's bloom—  
A vernal scarf to drape dead winter's tomb,  
A seamless robe of grasses green entwined,  
To wrap the world ; while, ever thoughtful, kind,  
The leafy screen, concealing all the bloom  
Which frosty fingers painted in the world.  
Her warp is time, which into moments spun,  
Leap back and forth across a woof of gold  
As in and out her fairy shuttles run,  
With sunshine filled. And beauty manifold  
Blossoms in the web—earth finished, heaven begun.*

—God's Tapestries ; JOHN TRACY JONES.

1831.—Woolen manufacture was established at York by two weavers from Brabant. 1850.—It was begun at Kendal.

1630-1634.—Drebbel discovered his new process of dyeing wool and silk, afterwards used in the Gobelins factories.

1762.—The cylinder carding machine was invented by Sir Robert Peel.

1802.—Merino sheep introduced in the United States.

1849-50.—Pollender and Davaine discovered bacillus anthrax, a disease of sheep and cattle.

1863.—Davaine discovered the same disease called anthrax in the blood of wool-sorters.

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MEMORANDA AND DIARY.

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PHILBERT DELORME.

- b. 1518 (?). *d. May 30, 1577.*  
 French architect under Henry II. Inventor of the cupola of the Halle Aux Farines at Paris. The most remarkable of his buildings are the crescent at Fontainebleau, the palaces of Mendon, St. Maur-des-Fossees, Anet, etc. The edifice to which his name is particularly attached is the well-known palace of the Tuileries.

*Here, curious architect,  
 If thou essayest, ambitious to surpass  
 Palladio, Angelo, or British Jones,  
 On these fair walls extend the certain scale  
 And turn th' instructive compass; careful mark  
 How far, in hidden art, the noble plain  
 Extends, and where the lovely forms commence  
 Of flowering sculptures; nor neglect to note  
 How range the taper columns, and what weight  
 Their leafy brows sustain.*

—*The Ruins of Rome: REV. JOHN DYER.*

- 1518.—The Cathedral of Notre Dame in Antwerp was completed.  
 1528.—Original plans for Fontainebleau drawn, probably by Giles Le Breton. Additions were made by Delorme under Henry II.  
 1557.—Philip II. laid the foundation of the Escorial in Madrid, Spain.  
 1566.—The building of the Tuileries was begun.  
 1857, August 14.—The magnificent building, the new Louvre, which was begun by Napoleon, was opened with splendid ceremony by Napoleon III.  
 1871.—The Tuileries was burned by the Commune.

HUMPHREY DAVY.

- b. December 17, 1778. *d. May 30, 1829.*  
 English chemist, and the Father of Experimental Philosophy. His discovery of the properties of chlorine and his decomposition of earths by galvanisms wrought great changes in the science of chemistry. The metal he obtained from potash he called potassium; and from soda, sodium. He discovered barium, calcium and strontium in 1807. He invented the miner's safety lamp. In 1802 he first showed the electric arc or "arch" on a small scale between pieces of carbon.

*That lamp's metallic gauze,  
 That curtain of protecting wire,  
 Which Davy delicately draws  
 Around explosive, dangerous fire.*

*Be this our trust, that ages (filled with light  
 More glorious far than those faint beams which shine  
 In this our feeble twilight) yet to come  
 Shall see distinctly what we now but hope,—  
 The world immovable in which alone  
 Wisdom is found, the light and life of things,  
 The breath divine, creating power divine,  
 The One of which the human intellect  
 Is but a type, as feeble as that image  
 Of the bright sun seen on the burning wave—  
 Bright, but without distinctness; yet in passing  
 Showing its glorious and eternal source.*

—*Thought: SIR HUMPHREY DAVY.*

1816, Jan. 9.—Davy's safety lamp first used in coal pit.



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MEMORANDA AND DIARY.

RICHARD LOVELL EDGEWORTH.

b. May 31, 1744.

d. June 13, 1817.

British inventor and author. A desire to know the result of a race led him to invent a plan for telegraphing. It is said to have been the first attempt. He made other inventions for sailing carriages and for a kind of velocipede. In 1768 he was awarded a silver medal for a land-measuring machine.

*Whatever is, is in its causes just,  
Since all things are by fate; but  
Sees but a part o' th' chain—the nearest link,  
His eyes not carrying to that equal beam*  
—Oedipus: DRYDEN.

*Naturally, men will choose to learn poetry, from the beginning of time they have done so. To immortal verse the memory gives a willing, a joyous, and a lasting home. However, some prose is poetical, is poetry, and altogether worthy to be learned by heart, and the learning is not so very difficult. It is not difficult or toilsome to learn that which pleases us, and the labor once given, is forgotten while the result remains.*

—VERNON LUSHINGTON.

1818.—A velocipede was invented by Joseph Nicphore Niepce.

1881.—The Otto bicycle was first patented.

1890.—Pneumatic tire safety bicycles were introduced.

1843, May 20.—Albert Augustus Pope was born. He was America's pioneer manufacturer of bicycles and the founder of the magazine "Outing."

ARISTOTLE.

b. 384 B. C.

d. 322 B. C.

Greek philosopher who is believed to be the founder of the science of botany. He was a disciple of Plato, and so famous was his learning that Philip of Macedon chose him to educate Alexander. Later he opened a school in the Lyceum and founded the sect of Peripatetics. He improved the knowledge of geography among the Greeks and was versed in every science then known, as is illustrated by his writings.

*Ask for what end the heavenly bodies shine,  
Earth for whose use? Pride answers, "Tis for mine;  
For me kind Nature wakes her genial power,  
Suckles each herb, and spreads out every flower;  
Annual for me, the grape, the rose, renew  
The juice nectarous, and the balmy dew;  
For me, the mine a thousand treasures brings;  
For me, health gushes from a thousand springs."*  
—Essay on Man: POPE.

*Aspect he rose, and in his rising seem'd  
A pillar of state; deep on his front engraven,  
Deliberation sat, and public care,  
And princely counsel in his face yet shone,  
Majestic, though in ruin. Sage he stood,  
With Atlantean shoulders, fit to bear  
The weight of mightiest monarchies; his look  
Drew audience and attention still as night  
On Summer's moonlit air.*

—Paradise Lost: MILTON.

1673.—Jacques Barrelier, botanist, died, aged 67.

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DE VOLSON WOOD.

2. June 1, 1832.

d. June 28, 1897.

American engineer. Professor of Engineering. He designed an ore dock in 1866 and invented a rock-drill, a steam-pump and an air-compressor. He published "Treatise on the Resistance of Materials" (1871); "Principles of Elementary Mechanics" (1878); "The Mechanics of Fluids" (1884).

*Laborious still, he taught the early mind,  
And urg'd to manners meek and thoughts refin'd ;  
Truth he impress'd, and every virtue prais'd ;  
While infant eyes in wondering circles gazed ;  
The worth of time would day by day unfold,  
And tell them every hour was made of gold.*

—TIMOTHY DWIGHT.

320 B. C.—Diving-bell first mentioned.

70 B. C.—Mithridates, King of Cappadocia, erected the first corn-mill driven by water.

1490.—Leonardo da Vinci made water-mills and river-locks. 1667-80.—Pierre de Bonrepos Riquet projected and finished the Languedoc canal.

1667.—A diving-bell was used on the coast of Mull in searching for the wreck of a part of the Spanish Armada.

1718.—Savery invented an engine for dragging rivers and raising waters.

1818.—John Braithwaite died. He was the constructor of the diving-bell, by means of which, in 1783, he descended into the Royal George, sunk at Spithead, and brought up the sheet anchor and many of the guns.

VINCENT VIVIANI.

b. 1622.

d.

1703.

Italian mathematician. He was the last pupil of Galileo and was instructed by Torricelli. He became geometrician and chief engineer to the Duke of Tuscany, and a member of various learned bodies; he restored a part of the lost works of Aristoteles and Apollonius, and wrote several valuable treatises on mathematics.

*To man's most wondrous hand the same voice cried,  
Advance !*

*Go, clear the woods, and o'er the bounding tide*

*Advance !*

*Go, draw the marble from its secret bed,*

*And make the cedar bend its giant head ;*

*Let domes and columns through the wandering air*

*Advance !*

*The world, O man ! is thine. But wouldst thou share ?*

*Advance.*

—ADVANCE : D. F. MCCARTHY.

570-547 B. C.—Anaximander invented the sundial and discovered the phases of the moon; he made a map of the known world.

252 B. C. (about).—Apollonius of Perga, flourished; he investigated the properties of Conic sections and wrote his celebrated work on Conics and also the lost work on Contacts.

1654.—Huygens completed the discovery of Saturn's ring. 1655.—He determined the annular form of Saturn and discovered one of its satellites.

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MEMORANDA AND DIARY.

GEORGE HENRY CORLISS.

b. *June 2, 1817.*

d. *February 21, 1888.*

American inventor of a machine for stitching leather, before the invention of the original Howe sewing-machine. He made many improvements in the steam-engine, and invented a machine for cutting the cogs of bevel wheels, an improved boiler with condensing apparatus for marine engines, and pumping engines for waterworks.

*Yes, this was one*

*Who lived to labor and study and plan ;  
The earth's deep thoughts he loved to reveal ;  
He banded the breasts of the land with steel ;  
The thread of his toil he never broke ;  
He filled the cities with wheels and smoke,  
And workers by day and workers by night,  
For the day was too short for his vigor's flight,  
Too firm was he to be feeling and giving ;  
For labor, for gain, was a life worth living.*

—Three Graves : JOHN BOYLE O'REILLY.

Boots are said to have been the invention of the Carians, and were made of iron, brass or leather.

907 B. C.—Homer mentioned boots.

1773.—First steam-engine built in America was set up.

1803.—A patent was granted to Trevethick and Vivian for a high-pressure locomotive engine.

1849, March 10.—Corliss patented his governor attaching directly to the induction valve so as to regulate the point of cut-off.

1893.—David Joy invented his connecting rod and valve motion.

SIR JOHN HAWKSHAW.

b. 1811.

d. *June 2, 1891.*

English civil engineer. He became engineer to the Manchester & Bolton Canal & Railway and also to the Lancashire & Yorkshire Railway (nearly the whole of which he constructed), and to several other railways. He constructed the Riga & Dunaberg Railway in Russia, the Penarth Harbor & Dock in the Cardiff Roads, the Londonderry Bridge in Ireland, the Charing Cross Railway in the metropolis and other public works.

*Lay down upon his Sheaf's green verge  
That brave old heart of oak,  
With flitting dings from sounding forge,*

*And pull of furnace smoke !  
— Where whirled the stone its busy rounds,  
And axe and sledge are swung,  
And, timing to their stormy sounds,  
His stormy lays are sung.*

—Elliot : WHITTIER.

*Many a patient investigator has puzzled his brain  
in trying to solve the problem which had yielded to  
a more fortunate laborer in the field, centuries before.*

—Presidential address before the British Association in 1875 :

SIR JOHN HAWKSHAW.

1755.—William Edwards built the bridge over the Taff River, called the New Bridge. At the time of erection it was the largest stone arch known to exist in the world.

1794.—First turnpike road was constructed connecting Lancaster with Philadelphia.

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THURSDAY.

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MEMORANDA AND DIARY.

JAMES HUTTON.

b. June 3, 1726.

d. March 26, 1797.

English geologist. Author of the Plutonian theory of geology. Ranks as the first great British geologist, and the independent originator of the modern explanation of the phenomena of the earth's crust by means of changes still in progress. He published "The Theory of the Earth, with Proofs and Illustrations" (1795).

*Through dark retreats pursue the winding ore,  
Search Nature's depths, and view her boundless store;  
The secret cause in tuneful numbers sing,  
How metals first were fram'd, and whence they spring  
Whether the active sun, with chemic flames,  
Through porous earth transmits its genial beams;  
With heat impregnating the womb of night,  
The offspring shines with its paternal light:  
Or whether, urged by subterranean flames,  
The earth ferments, and flows in liquid streams  
Purg'd from their dross, the nobler parts refine,  
Receive new forms, and with fresh beauties shine;  
Or whether by creation, first they sprung  
Then yet unpois'd the world's great fabric hung;  
Metals the basis of the earth were made,  
The bars on which its fix'd foundations laid;  
All second causes they disdain to own,  
And from th' Almighty's fiat sprung alone.*

—YALDEN.

1656. —Pendulum clocks were invented by Huygens.

1659. —Fromantill improved the pendulum.

RENE JUST HANY.

b. February 28, 1743.

d. June 3, 1822.

French mineralogist and botanist; brother of Valentine. Discoverer of crystallization, which he completely established.

*All great achievements are the natural fruits  
Of a great character.*

*This is my prophesy and prayer—  
Toil's glorious kingdom is at hand;  
Its blooms are rich, its fruits are fair,  
Ripening to fall in every land;  
The leaf is turning—we shall see  
The record on Time's brightest page,  
And swarthy Toil is yet to be  
The usher of the Golden Age.*

—JAMES MAURICE THOMPSON.

*Let us divide our labors; thou where choice  
Leads thee, or where most needs; whether to wind  
The woodbine round this arbor, or direct  
The clasping ivy where to climb; while I  
In yonder spring of roses, intermixed  
With myrtle, find what to redress till noon.*

—MILTON.

1840. —Schleiden and Nägeli made their researches in the study of plant cells and their development.

1851. —Hofmeister made his researches in morphology.

1895. —Professor Warming first presented Ecology as at present treated.



1904.

FRIDAY.

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MEMORANDA AND DIARY.

JOHN LE KENX.

CHARLES WARREN.

b. June 4, 1788.

English architectural engraver. Excelled in the engraving of Gothic architecture. He contributed much to the diffusion of a taste for Gothic architecture in England. He engraved part of Britton's "Cathedral Antiquities" and of Pugin's "Antiquities of Normandy" and "Gothic Specimens."

*Enraptured have I loved to roam,  
A lingering votary, 'neath vaulted dome,  
Where the tall shafts, that mount in massy pride,  
Their mingling branches shoot from side to side;  
Where elfin sculptors, with fantastic dew,  
O'er the long roof their wild embroidery drew;  
Where superstition, with capricious hand,  
In many a maze the wreathed window plann'd,  
With hues romantic tinged the gorgeous pane,  
To flit with holy light the wondrous fane.*

—WATSON.

1648.—Mezzotinto, a kind of copper engraving, was invented by Col. Ludwig von Siegen.

1648.—Prince Rupert invented mezzotint, a peculiar manner of engraving figures on copper.

1662.—It was improved by Sir Christopher Wren.

1662.—Abbe Jean Claude R. de Saint-Non invented aquatinta, by which a soft effect was given to engravings.

1818.—Jacob Perkins invented engraving on soft steel, which, when hardened, multiplied copper plates indefinitely.

1860.—The Author's birthday.

b. June 4, 1767.

English engraver. To him the arts are indebted for having brought to perfection the process of engraving on steel.

*The spider's touch, how exquisitely fine!  
Feels at each thread, and lives along the line;  
In the nice bee, what sense so subtly true,  
From pois'nous herbs extracts the healing dew!  
Remembrance and reflection how allied!  
What thin partitions sense from thought divide!  
And middle nature how they long to join,  
Yet never pass the insuperable line!  
Without this just gradation, could they be  
Subjected these to those, or all to thee?  
The powers of all subdu'd by thee alone,  
Is not thy reason all these powers in one?*

—Essay on Man: POPE.

*Every master has found his materials collected,  
and his power lay in his sympathy with his people,  
and in his love of the materials he wrought in.*

—Representative Men: EMERSON.

*Blessed is he who has found his work; let him  
ask no other blessedness. He has a work, a life-  
purpose; he has found it, and will follow it.*

—CARLYLE.

1423.—The art of engraving on wood for printing pictures was invented by Kepler at Nördlinger.

1440.—The art of copper-plate engraving was invented by Ruprecht Kust.

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MEMORANDA AND DIARY.

HENRY WURTZ.

b. June 5, 1828.

d. American chemist. In 1850 he discovered the mineral bisingerite in America; in 1850, methods for the production of alum, potassium chloride and potassium sulphate from green sand, marl and similar sources; in 1852, a method of preparing pure alkalies and alkaline earths; in 1865, one of applications of sodium amalgams; in 1869, new modes of manufacture of fuel gas by the alternating action of air and steam on cheap coal; in 1877, the production of magnesia by precipitation from sea-water by means of calcium hydroxide; in 1878 he discovered the minerals animikite and huntite; in 1882, a new method of concentrating and caking granular materials of all kinds, and a new method of distilling coal to obtain liquid products. He is the author of about sixty scientific memoirs.

*Many sealed doors of Nature's fair pavilions*

*Its cunning key of Science did unlock;*

*Silver and gold it digged by tons and millions,*

*And bridged the straits, and blasted ridge and rock;*

*And made a playground of God's sea; and filled*

*Deserts with cities, and the waste fields tilled.*

—*The Last Christmas of the Century*: SIR EDWIN ARNOLD.

1800.—Alum was first discovered in Syria; in 1460 it was found in Tuscany; in 1757 it was found in Ireland, and in 1790 it was found in Anglesey.

JOSEPH PITTON DE TOURNEFORT.

b. June 5, 1656.

d. December 28, 1708.

A celebrated French botanist. He was intended for the Church, but studied natural history. He published "Elements of Botany," "History of Plants near Paris," "Voyage to the Levant," and a treatise on *Materia Medica*.

*I envy not the Emathian madman's fame,*

*Who won the world, and built immortal shame*

*On tears and blood; but if some flower, new found,*

*In its embalming cup might shroud my name,*

*Mine were a tomb more worthily renowned.*

*Than Cheops' pile, or Arlemisia's mound.*

—*On a Green-House*: H. SMITH.

*We call them weeds; did we their form but study,*

*We many a secret might unfolded find;*

*Each tiny plant fulfills its heaven-taught mission,*

*And bears the impress of Immortal Mind.*

—*Weeds*: E. EVANS.

*Every book is a quotation; and every house is a quotation out of all forests and mines and stone-quarries; and every man is a quotation from all his ancestors.*

—EMERSON.

*What a parade we make of our science and how far off, and at arm's length, it is from its objects! Our botany is all names, not powers; poets and romancers talk of herbs of grace and healing; but what does the botanist know of the virtues of his weeds?*

—*Beauty*: EMERSON.

1850.—*Wellingtonia Gigantea*, largest tree in the world, was discovered by W. Whitehead in California.

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MEMORANDA AND DIARY.

## JUNE 6.

CYPRIEN TESSIE DU MOTAY.

b. 1819.

d. June 6, 1880.

French chemist. Among his inventions in Europe were : a process for etching glass ; improvements in electric light carbons ; a method for the preparation of oxygen on a large scale, and a method of illumination by its use, known as the "oxy-carburated light," which has been successfully used for lighting mines and large public places. While in America he patented a small rotary motor, improvements in steam condensers (1879), and a new method of artificial refrigeration (1880).

*False eloquence, like the prismatic glass,  
Its gaudy colors spreads in every place ;  
The face of Nature we no more survey,  
All glares alike, without distinction gay ;  
But True Expression, like the unchanging sun,  
Clears and improves whate'er it shines upon ;  
It gilds all objects, but it alters none.*

1415.—Street lights were introduced in London.

1774.—Streets were first lighted in Boston.

1792.—William Murdoch experimented in Cornwall with coal-gas as an illuminating agency.

1802.—The first public display of illuminating by gas was made at the rejoicings for the peace of Amiens.

1816.—Baltimore was the first city in U. S. lighted by gas.

1839.—The process of obtaining illuminating gas from water was patented by Cruikshank.

REGIOMONTANUS.

Johann Muller.

b. June 6, 1436.

d. July 6, 1476.

German astronomer. He is believed to have published the first almanac in Europe. He published his "Ephemerides" for thirty years and a "New Calendar" for the years 1475, 1494, 1513. He constructed some curious automata.

*Once, as this artist, more with mirth than meat,  
Feasted some friends whom he esteemed great,  
Forth from his hand an Iron Fly flew out,  
Which, having flown a perfect round about,  
With weary wings returned to her master,  
And as judicious on his arm he plac'd her.  
Oh ! wit divine, that in the narrow womb  
Of a small fly could find sufficient room  
For all those springs, wheels, counterpoise and chains,  
Which stood instead of life, and blood and veins.*

—DU BARTAS.

1420 B. C.—Chiron is said to have first divided the starry sky into distinct constellations.

160-125 B. C.—Hipparchus, the Father of Astronomy, lived and flourished.

1732, October 6—1811, February 9.—Nevil Maskelyne lived. He originated the "Nautical Almanack" (1767) and made exact observations of the planets at Greenwich and was the first to give a standard catalogue of stars (1790).

1761, June 6.—The transit of Venus is observed by the astronomer royal, Nevil Maskelyne, at St. Helena.

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MEMORANDA AND DIARY.

## JOHN RENNIE.

b. *June 7, 1761.*

Celebrated English civil engineer and mechanic, who first became known by the talent displayed in the Albion Mills. Among his numerous works are the Crinan, Lancaster, Kennet and Avon canals; the Southwark, Waterloo, and New London bridges; the breakwater at Plymouth, and several docks and harbors, among which are those of London, Hull and Sheerness. He greatly improved the diving bell and is generally credited with the invention of the present form of steam dredging-machine with a chain of buckets, but was anticipated by Sir Samuel Bentham. He used it on an extensive scale during the construction of the Hull docks (1803-1809).

*Life brings to each his task, and whatever art  
you select, algebra, planting, architecture, poems,  
commerce, politics,—all are attainable, even to the  
maraculous triumphs, on the same terms, of selecting  
that for which you are apt;—begin at the beginning,  
proceed in order, step by step. 'Tis as easy to twist  
iron anchors and braid cannons as to braid  
straw, to boat granite as to boat water, if you take  
all the steps in order. Wherever there is failure  
there is some giddiness, some superstition about luck,  
some step omitted, which Nature never pardons.*  
—*Considerations by the Way*: EMERSON.

1812.—First stone of Breakwater at Plymouth was laid.

1841.—First stone of lighthouse on its western extremity was laid.

## THOMAS DE LA RUE.

b. 1793.

d. *June 7, 1866.*

English inventor and manufacturer; father of Warren De La Rue. He established the well-known house which bears his name. We owe to him the substitution of the sulphate of barytes as a pigment in the place of white lead, and numerous improvements in printing inks. The embossing of bookbinders' cloth and paper hangings are his inventions, and he has taken out several patents for others, among which are improvements in playing cards and the fixing of iridescent thin films on paper.

*Years have passed; and my boy into manhood has grown.*

*I have watched, as his nimble hands move,*

*What a talent for skill and invention he's shown,*

*And I've guided his efforts with love.*

*As a noted inventor he has won wealth and fame;*

*Near the top of the ladder he stands;*

*But often I think of the time that he came,*

*Asking—"What shall I do with my hands?"*

—*What Shall I Do With My Hands*;

LIZETTE CLAYTON HOOD.

200 B. C.—King Attalus invented the square or present form of bookbinding; he and his son Eumenes established the famous library at Pergamus.

1377.—A parchment factory was established at Nuremberg, Bavaria.

1392.—Cards were invented to amuse Charles VI.

1750.—Machines for making cards were invented by a Bavarian.



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MEMORANDA AND DIARY.

SAMUEL WHITE BAKER.

b. June 8, 1821.

d.

1893.

English explorer. In 1861 he started out at his own expense to discover the sources of the Nile in the hope of meeting the government expedition under Captain Speke. On March 14, 1863, he discovered Lake Albert Nyanza. This was the first successful expedition directed from the north in the history of African discovery. In September, 1869, he undertook the command of an expedition under the auspices of the Khedive, returning in 1873.

*I seek the birth of that immortal River,  
Who bears great Egypt in her watery womb;  
Who nursed the world's prime empire on her bosom;  
And Moses, more illustrious than all  
Pharaohs, her earth-enthralled conquerors,  
Throned in their golden hundred-gated Thebes,  
Tomb'd in hoar wonder of the pyramids.  
At thy most holy source, primeval Nile!  
The Greek drank wisdom; yea, in solemn halls  
Of Memphis, in columnar stone forests  
Of mighty Karnac, rich with hieroglyph,  
And pictured symbol and weird shapes of gods.*  
—The Nile, Africa and Egypt: RODEN NOEL.

600 B. C.—The Phenicians circumnavigated Africa.

1402.—Jean de Bethencourt established a settlement on one of the Canary Islands.

1441.—The slave trade in Africa was begun by the barter of two captive Moors for ten negro slaves.

SAMUEL BATCHELDER.

b. June 8, 1784.

d. February 5, 1879.

American inventor; about 1832 he devised the first stop-motion to the drawing-frame, which has since been used in this country and in England; in 1832 he patented the steam-cylinders and connections now universally used in dressing-frames for drying yarns; his greatest invention was the dynamometer used for ascertaining the power for driving machinery. He was the author of a work, "Introduction and Early Progress of the Cotton Manufacture in the United States" (Boston, 1863).

*Better to weave in the web of life  
A bright and golden flitting;  
And do God's work with a ready heart,  
And hands that are prompt and willing,  
Than to snap the delicate, minute threads  
Of our curious lives asunder;  
Than to blame Heaven for the tangled ends,  
And sit and grieve and wonder.*

1537.—Knitting became known.

1589.—The art of weaving stockings in a frame was invented by the Rev. William Lee, of Cambridge, England.

1730.—The first cotton stockings were made.

1792.—The Cotton-gin was invented by Eli Whitney.

1821.—First cotton-mill was erected in Massachusetts.

1837, Nov. 23.—William Crompton patented his loom for fancy cotton goods.

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MEMORANDA AND DIARY.

SAMUEL SLATER.

b. June 9, 1768.

English machinist and inventor who came to America to establish mills for cotton manufacture. He served an apprenticeship at cotton-spinning with Jedidiah Strutt, the partner of Richard Arkwright, and aided him in his mills, and gained a thorough mastery of the new manufactory. On December 21, 1790, he started at Pawtucket three 18-inch carding-machines, the necessary drawing-heads with two rolls and four processes, the roving cases and winders for the same and the throstle spinning-frames of seventy-two spindles. In a short time reels were made for putting the yarn in skeins, in which form it was at that time placed upon the market. His yarn was equal to the best quality made in England. He was also interested in iron-manufactures; he acquired great wealth.

*He worshipped Industry, dreamt of her, sighed for her.  
Potent he grew by her, famous he died for her.  
They say he improved the world in his time,  
That his mills and his mines were a work sublime.  
When he died—the laborers rested and sighed.  
Which was it—because he had lived or died?*

—Three Graves; JOHN BOYLE O'REILLY.

1787.—Cotton mills at Beverly, Mass., manufactured corduroys and bed-ticking.  
1793.—A mill for manufacturing cotton yarns was erected by Slater at North Providence.

GEORGE STEPHENSON.

b. June 9, 1781.

d. August 12, 1848.  
English engineer; inventor of the railway locomotive. He constructed a safety lamp and tested it November 30, 1815, before he had ever heard of Sir Humphrey Davy's experiments. It is known as the "Gerod" lamp. One of his crowning achievements was the formation of the Manchester and Liverpool line, and the inauguration took place September 15, 1830. He has been called "The Father of the Railway System."

*At home, a king among his toys,  
The echoing whistle fills his cheeks;  
Till reason, curious at the noise,  
Quickly the sounding plaything breaks.*

*Reason essays itself to deeds;  
The knife carves out the secret thought;  
The whistling school-boy shouts and leaps,  
To see the toy his hand hath wrought.*

\* \* \* \* \*  
*But time, mind welder at the forge,  
His clinking hammer swings amain;  
Conglomerates with curious skill,  
Links thought to thought, a magic chain;*

*A chain, commencing when the soul  
First peered about with wondering eyes;  
Which ends not in the grave, but links  
In endless circles in the skies.*

—The Chain of Thought; ABBY ALLIN.

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MEMORANDA AND DIARY.

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JOHN DOLLOND.

b. June 10, 1706.

d. November 30, 1761.

English optician and inventor of the achromatic telescope. He was brought up to the hereditary trade of silk-weaving. He educated himself and succeeded in widening the field of the telescope, while giving greater distinctness to the image. Towards the close of his life he occupied himself with compiling almanacs for various parts of the world.

*I know the round worlds draw from far,  
Through hollow systems, star to star;  
But who has e'er upon a strand  
Of those great cables laid his hand?  
What reaches up from room to room  
Of chambered earth, through glare or gloom,  
Through molten flood and fiery blast,  
And binds our hurrying feet so fast?  
'Tis the earth-mother's love, that well  
Will hold the motes that round her dwell;  
Through granite hills you feel it stir  
As lightly as through gossamer:  
Its grasp unseen by mortal eyes,  
Its grain no lens can analyze.*

—Invisible: E. R. SILL.

1609.—Jakob Metius was regarded by Descartes as the inventor of the refracting telescope. The invention was claimed by Hans Lippershey and Zacharias Jansen.

1663.—James Gregory invented the refracting telescope.

1687.—Adrien Aunout described his movable wire micrometer.

ROBERT BROWN.

b. December 21, 1773.

d. June 10, 1858.

English botanist. Discovered the nucleus of the vegetable cell, the mode of fecundation in several species of plants, the development of the pollen and of the ovulum in the Coniferæ and Cycadeæ, and the bearing of these on impregnation in general. His memoirs place vegetable physiology upon the sure basis of exact observation of the vital functions of plants. His adoption of the natural system of Jussieu led to its general substitution in England in place of the Linnæan system.

*O, painter of the fruit and flowers,  
We thank thee for thy wise design,  
Whereby these human hands of ours  
In Nature's garden work with thine.  
And thanks that from thy daily need  
The joy of a simple faith is born.  
May trust thee for the autumn corn.  
Give fools their gold and knaves their power,  
Let fortune's bubbles rise and fall,  
Who sows a field or trains a flower  
Or plants a tree is more than all.  
For he who blesses most is blest,  
And God and man shall have his worth  
Who toils to leave as a bequest  
An added beauty to the earth.* —WHITTIER.

1735.—Linnean or artificial system was perfected.

1789.—A. L. Jussieu introduced his natural system of plant classification.

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MEMORANDA AND DIARY:

WILLIAM ROBERT BROOKS.

b. June 11, 1844.

d.

American astronomer and inventor. At the age of eighteen he delivered his first astronomical lectures. He was employed as a mechanical draughtsman, and invented many improvements in astronomical, photographic and other scientific instruments. He discovered several comets.

*Gaze on that arch above;  
The glittering vault admire.  
Who taught those orbs to move?  
Who lit their ceaseless fire?  
Who guides the moon to run  
In silence through the skies?  
Who bids that dawning sun  
In strength and beauty rise?  
There view immensely! behold! my God, is there:  
The sun, the moon, the stars, His majesty declare.  
—God is Every Where.*

1609.—Galileo made a telescope; 1610.—He discovered Jupiter's moons and noted the sun's spots; 1616.—His doctrines were condemned at Rome; 1633.—He was forced by inquisitors to abjure the Copernican theory; 1637.—He discovered the libration of the moon.

1737.—Dr. James Bradley discovered the nutation of the earth's axis.

1766, April 21.—A sun-spot, three times the size of the earth, passed the sun's centre.

1769.—The motion of sun-spots was observed by Dr. Wilson.

1779, April 19.—Two sun-spots, whose combined length extended 50,000 miles, were measured by Herschel.

ROGER BACON.

1314.

d. June 11, 1294.

A learned English monk of the Franciscan order, whose skill in astronomy was remarkable. He not only pointed out the error which occasioned the reformation in the calendar, and the distinction between the old style and the new, but also offered a more effectual reformation than that made by Pope Gregory XIII. The invention of gunpowder was known to him both as to its ingredients and its effect. He described accurately the effects of convex and concave lenses and demonstrated by actual experiment the practical benefit of eye-glasses. He left many treatises on the art of transmuting metals. His three great works are "The Opus Majus," "The Opus Minus," and "The Opus Tertium."

*You taught mysterious Bacon to explore  
Metallic veins, and part the dross from the ore;  
With sylian coal in whirling mills combine  
The crystal d nitre, and the sulphurous mine;  
Through wiry nets the black diffusion strain,  
And close an airy ocean in a grain—  
Pent in dark chambers, of cylindric brass,  
Slumbers in grim repose the sooty mass;  
Lit by the brilliant spark, from grain to grain  
Runs the quick fire along the kindling train;  
On the pain'd ear-drum bursts the sudden crash,  
Starts the red flame, and Death pursues the flash.—  
Fear's feeble hand directs the fiery darts,  
And strength and courage yield to chemic arts.*

—Botanic Garden; DR. DARWIN.



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MEMORANDA AND DIARY.

JOHN AUGUSTUS ROEBLING.

b. *June 12, 1806.*

German-American civil engineer; gave special attention to suspension-bridges when at school. He entered upon the manufacture of iron and steel wire and revolutionized the construction of bridges. In 1851-55 he built the suspension-bridge across the Niagara. It was the first suspension-bridge capable of carrying the weight of railroad trains. He built a wire-cable bridge over the Alleghany at Pittsburg. In 1868 he was chosen chief engineer of the East River Bridge, New York; in 1869 the work was begun. While making inspections he received injuries which resulted in his death.

*No lifeless thing of iron and stone,  
But sentient, as her children are,  
Nature accepts you for her own,  
Kin to the cataract and the star.*

*She marks your vast, sufficing plan,  
Cable and girder, bolt and rod,  
And takes you, from the hand of man,  
For some new handiwork of God.  
Your anchorage upbears the march  
Of time and the eternal powers.  
The sky admits your perfect arch,  
The rock respects your stable towers.*

—Brooklyn Bridge: CHARLES G. D. ROBERTS.

1870, January 3.—Work on East River Bridge was commenced by sinking a caisson on Brooklyn side; 1876, August 14.—First wire was drawn over; 1884, May 24.—Bridge was opened.

EDWARD TROUGHTON.

b. 1753.

d. *June 12, 1835.*

English mechanic and instrument maker. He made several telescopes for different observatories and invented improvements in astronomical instruments, in the fabrication of which he surpassed all of his contemporaries. In 1809 he invented a new method of graduating circles, considered the greatest improvement ever achieved in the art of instrument making.

*Now the day is spent,*

*And stars are kindling in the firmament  
To us how silent!—though like ours, perchance  
Busy and full of life and circumstance.*

—*Human Life*: ROGERS.

*Ye quenchless stars! so eloquently bright,  
Untroubled sentries of the shadowy night,  
While half the world is tapp'd in downy dreams  
And round the lattice creep your midnight beams,  
How sweet to gaze upon your placid eyes,  
In lambent beauty looking from the skies!*

—*The Starry Heaven*: ROBT. MONTGOMERY.

*It is a poor telescope that keeps you thinking of its  
lens, and does not make you possess the star.*

—PHILLIPS BROOKS.

1872.—John William Draper obtained a spectra of the stars and showed their fixed lines, by use of photography with telescopic combination.

1879, Sept.—A. Ainslie Common's powerful reflecting telescope, speculum 37½ inches in diameter, length, 20 feet, was completed at Ealing, Middlesex.

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MEMORANDA AND DIARY.

# JUNE 13.

JAMES CLERK MAXWELL.

b. June 13, 1831.

d. November 5, 1879.

English physicist. Best known for his researches in electricity and magnetism. Author of the modern theory of electricity. He showed that light, heat, electricity and magnetism could be ascribed to periodic movements in the ether which differ only in their frequency and wave lengths. He studied the kinetic theory of gases, and pointed out that the velocities of the different molecules, even if equal in the beginning would become unequal immediately in consequence of the collisions. He therefore devised the statical method of treating the problem. He extended the theory of diffusion and explained the phenomena of viscosity and of conduction of heat. Among his works are "Theory of Heat" (1871), "Matter and Motion" and "Electricity and Magnetism" (1873).

*So has God-given labor raised the Man,  
That, chaos-conquering, his mighty arm  
Now reaches proudly round the globe,  
In signal triumph over Time and Space.  
The gulf between him and the seraphim  
Is straitly narrowed to a single step;  
Toil-lifted from the gloom of ignorance,  
He holds the key to solemn mystery,  
And with unclouded eyes perceives God's dream  
In all its glory and its melody.  
Say, where exists more splendid prophecy?  
—The Maker's Image; ALBERT C. ANDREWS.*

THOMAS YOUNG.

b. June 13, 1773.

d. May 10, 1829.

English physician and natural philosopher. Among his chief discoveries was the interference of the rays of light.

*Though few of such gem the earth, yet such rare gems there are,  
Each shining in his hallowed sphere, as virtue's polar star.  
Though human hearts, too oft are found, all gross, corrupt  
and dark,  
Yet, yet, some bosoms breathe and burn, lit by Promethean  
spark.*

—ELIZA COOK.

280 B. C.—Euclid claimed that light traveled in straight lines.

1665.—Robert Hooke propounded the first elements of the undulatory theory of light.

1669.—Newton lectured on the analysis of light. He originated the emission theory and opposed the undulatory theory.

1678.—Discovery by Romer of the velocity of light.

1727.—The aberration of the light of stars was discovered and explained by Dr. James Bradley.

1801.—Thomas Young discoursed on the interference of light and, by experiments, confirmed the undulatory theory of light.

1801.—Johann W. Ritter discovered chemical rays.

1849.—The velocity of light was measured by the method invented by Hippolyte Louis Fizeau.

1874.—Cornu's improved tooth-wheel apparatus for measuring the velocity of light gave 300,400 kilometers in a second of time.

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MEMORANDA AND DIARY.

JACOB WREY MOULD.

b. 1825. *d. June 14, 1886.*

King's College, London, 1842.  
English-American architect. He spent two years in Spain studying the Alhambra. This Moorish style of architecture had much influence upon his subsequent work. With Mr. Jones he designed the Moresque-Turkish divan of Buckingham Palace and the decorations of the exposition building of the World's Fair of 1851. He came to New York in 1853 and designed and built All Souls' Church and the Unitarian Church in New York, at the corner of Fourth avenue and Twentieth street. His design included a lofty and slender campanile, which has never been built; the church was marked by architectural and sculptured detail. His last work was the design for the temporary tomb of General Grant in Riverside Park.

*Whether, O Friend of Art! your gems derive  
Fine forms from Greece, and fabled gods revive;  
Or bid from modern life the portrait breathe,  
And bind round Honour's brow the laurel wreath;  
Buoyant shall sail, with Fame's historic page,  
Each fair medallion o'er the wrecks of age;  
Nor Time shall mar; nor Steel, nor Fire, nor Rust  
Touch the hard polish of the immortal bust.*  
—Botanic Garden: DR. DARWIN.

117-138.—Adrian erected the double temple of Venus, a temple to the goddess Roma, the Athenæum, and the magnificent villa at Tibur.

ANDREW CAMPBELL.

*d.* *d. June 14, 1821.*

American inventor. In 1837 he invented the brush-drawer's vise; in 1846 he designed and built the "Great Western," a large omnibus; he constructed over Cedar River, Iowa, the longest single span wooden bridge erected at that time; in 1861 he built a newspaper press, which was the first registering power-printing press for color-work ever invented; in 1866 he invented his two-revolution book-press, and in 1868 his art-press for fine illustrations. He constructed the first press that printed, inserted, pasted, folded and cut in one operation.

*Blest be the gracious Power, who taught mankind  
To stamp a lasting image of the mind!  
Beasts may convey, and tuneful birds may sing,  
Their mutual feelings, in the opening spring;  
But Man alone has skill and power to send  
The heart's warm dictates to the distant friend;  
'Tis his alone to please, instruct, advise  
Ages remote, and nations yet to rise.*  
—The Library: CRABBE.

1561.—The first coach was brought to Scotland when Queen Mary came from France. It belonged to Alexander Lord Seaton.

1564.—Coaches first made in England; and came into use in 1569.

1838.—Omnibuses were invented in the seventeenth century, but never used; for practical traffic they were first used in Paris.

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MEMORANDA AND DIARY.

ETIENNE GASPARD ROBERT ROBERTSON.

b. June 15, 1763.

d. July 1837.

Belgian aeronaut and physicist. In 1787 he invented phantasmagoria, or the magic-lantern, by which images are cast upon a screen.

*Now indeed I mount up; my heart beats, my hair bristles,  
The sun throws its light on my sparkling balloon;  
And as I move onward, oh, how the wind whistles,  
How rattle the cords, as I sail to the moon!  
Below me are fields, cities, water and woods;  
Light and darkness distinguish the land from the floods.  
A gooseberry-bush Epping Forest appears;  
Ah, me!—should I fall there—away, ye vain fears;  
I mark the deep ruts—like black ants are the men,  
How busy they move!—but already I ken  
More distant the pale orb—the Russell's map I find true,  
And the Man in the Moon stands there full in my view.  
—Voyage in a Balloon: Mordaunt's Imitation of the "Peace"  
of Aristophanes.*

1648, September 19.—Pascal and his brother-in-law, Perier, first used the barometer tube to show or determine elevations.

1692.—Robert Boyle stated his law of pressure and volumes of gases.

1736.—Dom Guzman first made a balloon inflated with hot air in Portugal.

1766.—Henry Cavendish discovered that hydrogen gas is eight times lighter than the atmosphere.

1770-1823, August 18. Andre Jacques Garnerin lived. He was a French inventor, and the first to propose the parachute.

1783, August 27.—A balloon filled with hydrogen made an ascent at Paris.

EMPEDOCLES.

Greek philosopher; also excelled in medicine and poetry. He originated or adopted the theory that nature consists of four elements—fire, air, earth and water. He was the first person known to have attempted to write systematically upon the subject of light. His greatest work was a poem on the "Nature and Principles of Things." He flourished 450 B. C.

*Without thee what were unenlightened men?  
A savage, roaming through the woods and wilds  
In quest of prey, and with the unfashioned fur  
Rough-clad; devoid of every finer art  
And elegance of life.*

—Philosophy: THOMSON.

640-546 B. C.—Thales, of Miletus, made the primary substance water and taught the spherical form of the earth.

610 B. C.—Anaximander, a disciple of Thales, a Milesian philosopher, was born. Metaphysician, mathematician, astronomer and writer. He was the first to write on geography and to prepare a chart of the countries he knew.

1684.—The theory of the tides, first satisfactorily explained by Kepler in 1598, was more completely explained by Sir Isaac Newton.

1778.—Antoine Laurent Lavoisier overthrew the theory of "phlogiston" by proving the action of oxygen.

1815.—Davy's safety-lamp appeared; the flame was inclosed with wire meshes.

1826.—Lieut. Thomas Drummond produced lime-light by the combustion of oxygen and hydrogen on the surface of lime (Drummond light).



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## JULIUS PLUCKER.

*b. June 16, 1801.*

University of Bonn, Heidelberg and Berlin.

German mathematician and physicist. The first observer to leave any record of the cathode rays; in 1859 he observed the now well known green phosphorescence on the glass in the neighborhood of the negative electrode. He introduced the method of abridged notation, which is a characteristic feature of modern analytical geometry. He also invented line geometry.

*At Learning's fountain it is sweet to drink*

*But 'tis a nobler privilege to think;*

*And oft, from books apart, the thirsting mind*

*May make the nectar which it cannot find.*

*'Tis well to borrow from the good and great;*

*'Tis wise to learn; 'tis godlike to create!*

—*The Library*: J. D. SAXE.

300 B. C.—Euclid lived during the reign of Ptolemy I. He was a Greek born in Tyre and lived in Damascus. He is called the Father of Geometry. He wrote "Elements." In writing his Elements Euclid doubtless availed himself of what had been done by his predecessors, and Eudoxus doubtless contributed the doctrine of proportion as applied to incommensurables and also the method of exhaustions, and Theaetetus contributed books 10 and 13. Books 14 and 15 on solids were supposed to have been written by Hypsicrates and Damascus.

1666-71.—Newton discoursed on dispersion of light, and proved its compound nature by means of the prismatic lens. He constructed his reflecting telescope.

## ANDREA OF PISA.

*b. about 1270.*

*d.*

1345.

Italian architect and sculptor. He was one of the first to abandon the Gothic style for the antique models of Greece. He designed the Castello di Scarperia and the church of San Giovanni at Prato. His masterpiece of sculpture is the bronze reliev of the gates of the baptistry of San Giovanni at Florence (1339).

*Is not here, O Rome, in any of these thy churches;*

*Is not here, but in Freiburg, or Rheims, or Westminster Abbey*

*What in thy dome I find, in all thy recenter efforts.*

*Is a something, I think, more rational far, more earthly,*

*Actual, less ideal, devout not in scorn or refusal,*

*But in a positive, calm, Stoic-Epicurean acceptance,*

*This I begin to detect in St. Peter's and some of the churches*

*Mostly in all that I see of the sixteenth-century masters*

*Overtold, of course, with infinite gauds and gewgaws.*

—*Amour de Voyage*: CLOUGH.

1383 B. C.—The Doric order of architecture was invented by the Dorians.

1350 B. C.—The Ionic order of architecture was invented.

540 B. C.—Callimachas invented the Corinthian order of architecture.

493.—Theodosius introduced into Italy the superior architecture of Greece.

800-1066.—The gothic style of architecture appeared in Earl Barton's Church, St. Peter's, Lincolnshire. It is the earliest example of early English style.

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FRANÇOIS MARIE CHEVENARD.

b. June 17, 1753.

d. June 28, 1835.

French flower painter and silk manufacturer. Invented muslin paper and, together with a relative, Henry Chevenard, discovered a means of reducing the price of carpets by the use of felt made impervious to dampness by a treatment with a bituminous composition, and also by the use of cheaper materials, including varnished stuffs and cows' hair.

*This, this! is beauty; cast, I pray, your eyes  
On this my glory! see the grace! the size!  
Was ever stem so tall, so stout, so strong,  
Exact in breadth, in just proportion, long!  
These brilliant hues are all distinct and clean,  
No kindred tint, no blending streaks between;  
This is no shaded, run-off, pin-eyed thing,  
A king of flowers, a flower for England's king;  
I own my pride, and thank the favoring star,  
Which shed such beauty on my fair Bizarre.  
Thus may the poor the cheap indulgence seize,  
While the most wealthy pine and pray for ease;  
Content not always waits upon success,  
And more may be enjoyed who profits less.*  
—TRADES: CRABBE.

800 B. C.—Carpets were in use for tents.

170 B. C.—Paper invented in China, white paper first made in England, 1690.

1340.—Blankets were first made in England.

1685.—The manufacture of velvet, long confined to Italy and later to France, was introduced into England.

WILLIAM PARSONS ROSSE.

b. June 17, 1800.

d. October 31, 1867.

English astronomer. His reputation was made by the construction of a great astronomical telescope (1844), and by his sidereal or nebular discoveries. In 1828 he invented an engine for grinding and polishing specula by steam power, and he contributed greatly to the art of constructing reflectors by publishing details of his methods.

*How brilliant on the Ethiope of Night  
Beams yon fixed star! whose intermitting blaze,  
Like woman's changeful eye, now shuns our gaze,  
Then sparkles forth in loveliness of light.  
Still-twinkling speck! thou seemest to my sight  
In size a spangle on the Tyrian stole,  
Of majesty, mid hosts more mildly bright,  
Altho' of worlds the centre and the soul!*

*Sure 'twas a thing for angels to have seen,  
When God did hang those tresses thro' the sky—  
Suns, founts of life! and Darkness sought to screen  
With dusky wing her glazed and haggard eye—  
In vain, for, pierced with myriad shafts, she died;  
And now her timid ghost dares only brood  
O'er Planets in their midnight solitude—  
Doomed all the day in Ocean's cave to hide.*  
—THE STAR; Literary Gazette.

1862.—Leon Foucault exhibited a reflecting telescope, the mirror of which was  $31\frac{1}{2}$  inches in diameter, the focal length  $17\frac{3}{4}$  feet.

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## WILLIAM LASSELL.

b. June 18, 1799.

d. October 5, 1880.

English astronomer, for many years a brewer in Liverpool. He was one of the perfectors of the reflecting telescope. He first clearly ascertained the composition of the Uranian system and discovered a satellite of Neptune. He catalogued six hundred new nebulae.

*I know that thou hast led, with regal port,  
The potent spirits of humanity.  
Before the van of niggard Time, and borne,  
With stride gigantic, man's advancing race  
From power to power; till, like a host of gods,  
They mock my elements, and drag the secrets  
Of my mysterious forces up to light,  
Giving them bounds determinate and straight,  
And of their natures, multiiform and huge.*

—Song of the Earth: GEORGE H. BOKER.

1400 B. C.—The constellations of Orion, the Pleiades and the Hyades are alluded to in the Book of Job.

1350.—Roger Bacon described the principle on which telescopes were afterwards constructed. He invented the magic lantern, 1290. He invented the camera obscura, and in 1290 spectacles.

1610, July 8.—First telescope constructed.

1663.—A telescope was suggested by the Marquis of Worcester in his Century of Inventions; he also suggested the steam engine as a "way to drive up water by fire."

1663.—Scot James Gregory invented a reflecting telescope.

## APOLLONIUS.

He flourished about 200 B. C. at Alexandria, under the reign of Ptolemy Philopater. He is one of the four fathers of the science of mathematics; the others being Euclid, Archimedes and Diophantus. His only work that is extant is a treatise on Conic Sections, in eight books, of which only four exist in the original language. Three have been translated from the Arabic and the fourth was restored by Halley from other sources. He discovered the method of representing by epicycles the phenomena of the stations and retrogradations of the planets.

*The wish to know—that endless thirst,  
Which ev'n by quenching is awak'd,  
And which becomes or blest or curs'd,  
As is the fount whereat 'tis slak'd—  
Still urg'd me onward, with desire  
Insatiate, to explore, inquire.*

—Loves of the Angels: MOORE.

161-126.—Hipparchus, the greatest astronomer of antiquity, originated the science of trigonometry and calculated a table of chords in twelve books.

246-300 A. D.—Diophantus was an algebraist and wrote his epitaph in the following words: "Diophantus passed one-sixth of his life in childhood, one-twelfth in youth and one-seventh more as a bachelor; five years after his marriage was born a son, who died four years before his father at one-half his father's age." He wrote Arithmetica in twelve books, seven of which are extant.

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MEMORANDA AND DIARY.

NICHOLAS AMATI.

- b. 1596. d. 1684.  
Great violin-maker. He was the tutor of Stradivarius and about fifteen others who afterwards became famous violin-makers of Venice, Milan and Cremona. His violins are renowned throughout the world for their delicacy and sweetness, though not possessing the union of liquidity and power that are noticeable in the violins of Joseph Guarneri and Stradivari.

*For, as the sea-shells found along the shore  
Retain the echoes of the ocean's roar,  
And murmur with the music of the spheres—  
So are old violins intaid with song  
Distilled of memories that throb and throng  
Athwart their dream-life of a thousand years.*

*So do we reach at last the perfect thing;  
And when a master comes and makes it sing  
With tones in which a thousand years are massed,  
We do not hear the hand-stopped notes alone,  
We catch an over and an undertone,  
We hear the present while we feel the past.*

—The Violin: ALFRED LEE DONALDSON.

- 1690.—The clarionet was invented by Johann C. Denner, of Leipzig, at Nuremberg, Bavaria.  
1825 (about).—The concertina was invented by Sir Charles Wheatstone.  
1832.—The Boehm flute was invented in Europe.  
1833.—The seraphine, a reed musical instrument, was introduced by John Green in London.

JOSEPH GUARNERI.

- b. 1683. d. 1745.  
He was the greatest of a celebrated Italian family of violin-makers of Cremona.

*The lines are miniatures of nature's curves,  
Of those long, timber, God-begotten curves  
That lure the eye along the lonely strand.  
The bend of lilies and the stoop of trees,  
The fountain's arching to a summer's breeze,  
Are simulated by the Master's hand.*

*As when the eye forsakes an incurved beach  
To glance along a sparkling, golden reach  
Of distant dunes that far to sea unroll,  
So doth it follow the slim neck to where,  
Like four straight sunbeams that have lost their glare,  
The strings are focused in the swan-like scroll.*

—The Violin: ALFRED LEE DONALDSON.

- 995 (about).—Guido Aretine was born. He was a monk of Arezzo. He invented points and rhombuses, and introduced the use of five parallel lines upon and between which he wrote notes of music, in 1024. The seven letters formerly used as notes now became clefs. He is the alleged inventor of the musical gamut.

The present violin bridge was perfected by Stradivarius.

- 1580-1640.—The Brescian violin-makers, Gaspard di Salo and Maggini, flourished.

1620.—Testatori, of Milan, invented the present form of the violin.

1683-1713.—Corelli, the most eminent of early violin musicians, lived.



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CHRISTOPHER MINER SPENCER.

b. June 20, 1833.

d.

American inventor; identified with drop forgings, turret machines and guns. He made the turret machine automatic, and produced the automatic screw machine, which can make any small machine part of generally circular outline without human intervention. He invented a blank cam cylinder of large diameter, to which small pieces of plain iron bars of rectangular section could be screwed in any desirable position, so as to constitute an endless succession of different cams, suited to produce any required movements of the turret machine members, by "setting up" the cam strips on the cylinder. He invented the double-turret screw machine.

*Were the use of iron lost among us we should in a few ages be unavoidably reduced to the wants and ignorance of the ancient savage Americans, so that he who first made known the use of that contemptible mineral may be truly styled the father of Arts and the mother of Plenty.*

—JOHN LOCKE.

1704-1776.—Benjamin Huntsman invented crucible cast-steel.

1706.—Thomas Savery patented a double-hand bellows sufficient to melt metals.

1764.—Peter Hasenclever established the first iron furnace in New Jersey.

1783.—Henry Cort, the Father of the Iron Trade, patented the so-called "grooved rolls," now known as "puddling rolls."

MELANCTHON WELLS MASON.

b. 1805.

d. June 20, 1875.

American inventor; invented many important improvements in locomotives which have since come into general use. He designed the lap-and-lead valve, which was put on the first engine in 1840; the four-driving-wheel locomotive; and a locomotive head-light, which he perfected in 1842. He invented a snow-plough and was the builder of the first four-cylinder engine, called the "E. P. Williams."

*With lungs of fire, and ribs of steel,  
With sighing valve, and groaning wheel,  
With starting scream, and giant stroke,  
With showers of sparks, and clouds of smoke,  
The iron steed the train is bringing!  
So look out while the bell is ringing!  
—Look out for the Engine while the Bell is Ringing.*

1612.—A steam apparatus was invented by Solomon de Caus. 1615.—He published, at Heidelberg, a work on motive power which advances the theorem on the expansion and condensation of steam.

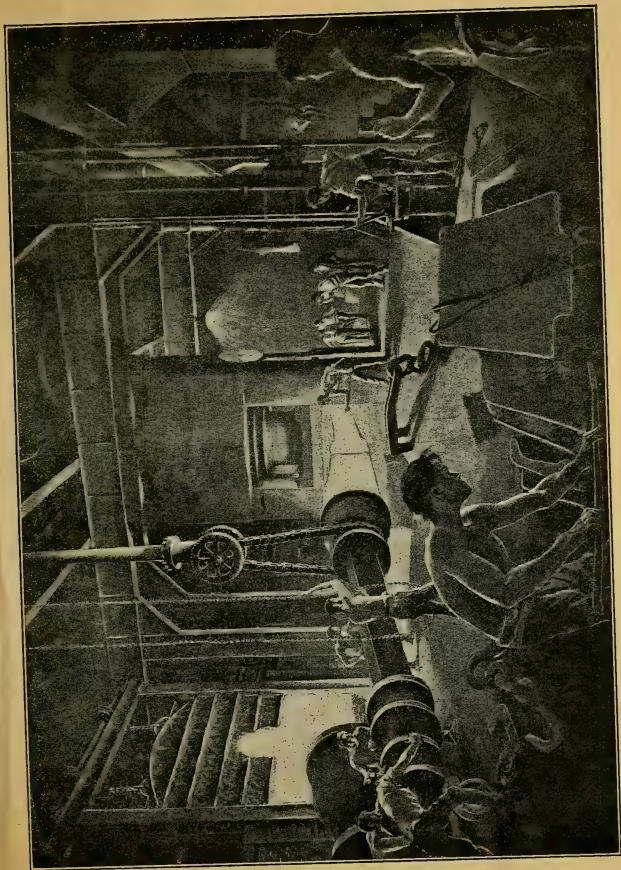
1681.—Denis Papin invented "Papin's digester," applicable to the steam-engine.

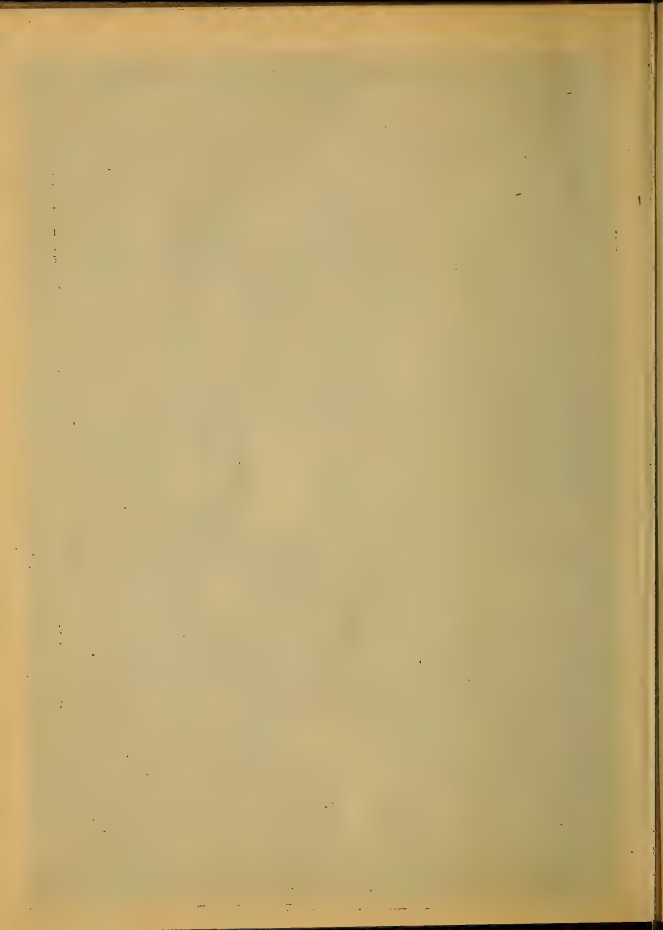
1768, May.—James Watt completed his model of the steam-engine.

1781-84.—Watt secured a patent for the first double engine.

1781-84.—Hornblower invented a double cylinder engine.

1804.—Woolf's double cylinder expansion engine was constructed.





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SIMEON DENIS POISSON.

b. June 21, 1781. d. April 1840.

French geometer. In his "New Theory of Capillary Action" (1831) he completed the researches of Laplace by super-adding the consideration of the variation of density. It was in the domain of mathematical physics that his genius was best displayed. He brought this science to great perfection, especially in its application to static electricity and magnetism.

*His highest wishes to secure that truth*

*Which man from Nature in herself can wring,*

*Crude facts, in the habitations uncouth,*

*In which from hard experiment they spring—*

*The crucible, the anvil, the harsh ring*

*Of formulas and of logic.*

—*Alwyn*; JAMES C. MOFFAT.

1861.—The barometer, for use as a weather-glass, and the manometer were invented by Otto von Guericke.

1767.—Lane's discharging electrometer was completed.

1772.—Henley's discharging electrometer was invented.

1789.—The Rev. A. Bennet invented the goldleaf electrometer.

1820.—An electroscope was invented by Bohnenberger.

1848.—An induction electrometer was invented by Peltier.

1863, April 25.—The electrophone, invented by Dr. Strethill Wright, for producing sound by electric currents of high tension, was exhibited before the Royal Scottish Society of Arts.

CHARLES THOMAS JACKSON.

b. June 21, 1805. d. August 28, 1880.

American scientist. In 1834 he constructed, successfully worked, and exhibited to his friends, a telegraphic apparatus similar to the model patented a year later by S. F. B. Morse, priority over which was always claimed by Dr. Jackson. His name has been prominently mentioned in connection with the discovery of the anaesthetic properties of ether and nitrous oxide. His scientific discoveries were numerous and included a powerful blast-lamp for alkaline fusions.

*Glorious your aim—to ease the laboring heart,  
To war with death, and stop his flying dart;  
To trace the source whence the fierce contest grew,  
And life's short lease on easier terms renew;  
To calm the frenzy of the burning brain,  
And heat the tortures of imploring pain;  
Or, when more powerful ills all efforts brave,  
To ease the victim no device can save,  
And smooth the stormy passage to the grave.*

—*The Village*; CRABBE.

1851, June 12.—Oliver Joseph Lodge was born. He was on the track of the nearly simultaneous discoveries made by Hertz. He discovered the power of electricity to coagulate or condense suspended particles of fume or fog. In 1894 he demonstrated a method of signalling across space. He devised and executed a plan for synchronising or tuning the emitter and receiver in wireless telegraphy, so that the response is discriminative as well as highly efficient. His work was followed by Marconi and it made wireless telegraphy possible.

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MATTHIAS JAKOB SCHLEIDEN.

- b. 1804. *d. June 22, 1881.*

German botanist; Professor in the University of Jena. He brought the nucleus to popular attention and asserted its all importance in the economy of the cell. He came to believe that the nucleus was really the most important portion of the vegetable cell, in that it is the original structure from which the remainder of the cell is developed. He named it the cytoblast.

*Lo! on each Seed within its slender rind  
Life's golden threads in endless circles wind;  
Maze within maze the lucid webs are roll'd,  
And, as they burst, the living flame unfold.  
The pulpy acorn, ere it swells, contains  
The Oak's vast branches in its milky veins;  
Each ravel'd bud, fine film, and fibre-line  
Traced with nice pencil on the small design.  
The young Narcissus, in its bud compress'd,  
Cradles a second nestling on its breast;  
In whose fine arms a younger embryo lies,  
Folds its thin leaves, and shuts its floret eyes;  
Grain within grain successive harvests dwell,  
And boundless forests slumber in a shell.*

—Botanic Garden; DR. DARWIN.

16 C.—Malpighi and Grew investigated the finer structure of plants and discovered cellular tissues.

1772 Corti and 1807 Treviranus discovered motion in cells.

1838.—Schleiden and Schwann established the fact that higher organisms were composed of cells.

1846.—Mohl called this living substance protoplasm.

JAMES BEAUMONT NEILSON.

- b. *June 22, 1792. d. January 18, 1865.*

Scotch iron manufacturer; inventor of the hot-blast. He was manager of the Glasgow Gas Works and introduced improvements in the manufacture of gas, then in its infancy. He was the first who used clay retorts and he introduced sulphate of iron as a self-acting purifier, passing the gas through beds of charcoal to remove its oily and tarry elements. He invented the swallow-tail or union jet.

*The heroes of the plow and loom,*

*The anvil and the forge;*

*The delvers down amid the gloom*

*Of yonder rocky gorge;*

*Heroes who built yon lofty tower,*

*And forged its heavy bell,*

*Which, faithfully proclaims the hour,*

*And marks its flight so well.*

—*The Heroes of Industry*; G. P. R.

*Must Britons be condemned for ever to wallow  
In filthy soot, noxious smoke, train oil and tallow,  
And their poisonous fumes for ever to swallow?  
For with sparky soot, snuffs and vapors, men have constant  
strife,*

*Those who are not burned to death are smothered during life.*

872-900.—King Alfred invented lanterns of scraped horn.

1681.—The streets were first lighted with oil-lamps in London.

1807.—Gas was introduced in Pall Mall, London.

1819.—Gas-light was introduced in Paris.



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## ETIENNE LOUIS MALUS.

b. *June* 23, 1775.

d. *February* 23, 1812.

French optician and military engineer. What is known as the "polarization of light" was discovered by him while investigating double refraction of crystals. He found that when the light fell upon a surface of glass at a certain angle, a portion of the reflected light appeared to have acquired entirely new properties in regard to further reflection, and a like property was possessed by that part of the ray of light which passed through the glass. This was termed polarization of light. Malus was a believer in the corpuscular theory of light.

*From these, descending to the earth, she turns,  
And matter, in its various forms, discerns;  
She parts the beamy light with skill profound,  
Meets the thin air, and weighs the flying sound;  
'Tis hers the lightning from the clouds to call,  
And teach the fiery mischief where to fall.*

—*The Library*; CRABBE.

1808.—Etienne Louis Malus discovered polarization of light by reflection.

1826.—Fox Talbot observed the orange line of strontium in the spectrum.

1847.—The saccharometer, an instrument for determining the amount of sugar in solutions, was invented by Jean Baptiste Francois Soleil; it was afterwards improved by Jules Dubosq.

## ETIENNE LENOIR.

b. 1744.

d.

1832.

French engineer who distinguished himself by improving optical instruments, especially large astronomical instruments, for which he received prizes. He made the first lighthouse with parabolic reflector, 1788.

*God bade the Sun with golden steps sublime, Advance.  
He whispered in the listening ear of Time, Advance.  
He bade the guiding Spirit of the Stars,  
With lightning speed, in silver-shining cars,  
Along the bright floor of his azure hall, Advance.  
Sun, Stars and Time obey the voice, and all Advance!  
—D. F. MCCARTHY.*

1630.—Kircher described the effects of repeated reflections as in the kaleidoscope.

1814.—The kaleidoscope was suggested by David Brewster, in London; in 1817 it was perfected.

1825.—The actinometer was invented by Sir John Herschel; it measured the heating power of the solar rays.

1838.—Prof. Charles Wheatstone made optical discoveries. He invented the reflecting stereoscope.

1849.—Sir David Brewster invented the lenticular stereoscope.

1855.—The prismatic stereoscope was invented by Brewster.

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HOLMES HINKLEY.

b. June 24, 1793.

d. February 7, 1866.

American inventor. He built the third stationary engine that was produced in Massachusetts, and in 1840 began to construct locomotives on a new and ingenious plan. During the Civil War he made shot and shell for the government.

*No laurel that drips with the blood of the brave,  
No crown that hangs over the conqueror's grave,*

*No wreath that is woven in weeping;*

*The olive that circles the forehead of toil,*

*Is the fruit that we glory in reaping.*

*Then a song shall arise melodious might,*

*To God, who has severed the dark from the light,*

*And the work and the workmen created;*

*By the play of the muscles He holds us in health,*

*By the sweat of the brow can endow us with wealth,*

*In the love of our labor elated.*

—*The Choral Workman's Song.*

1811.—A ferry-boat propelled by steam ran between New York and Hoboken, the first in the country.

1815.—First steamboat ascended the Mississippi to Louisville.

1817.—Steam navigation began on Lake Erie.

1825.—First boats arrived in New York via the Erie Canal.

1853, February.—First successful steam-engine built in the United States was completed.

THOMAS BLANCHARD.

b. June 24, 1788.

d. April 16, 1864.

American inventor. Invented a machine for making tacks, improved the manufacture of musket barrels and turned the gun-stock by machinery, and he improved the steamboat. He made improvements in railroads and locomotives, and invented a steam-wagon before any railroad had ever been built. In 1851 he devised a process for bending heavy timber and constructed a machine for cutting and folding envelopes at a single operation.

*Invention is activity of mind, as fire is air in motion;*

*A sharpening of the spiritual sight, to discern hidden aptitudes.*

—*Proverbial Philosophy*; TUPPER.

*The eye cannot make light, nor the mind spirit;*

*Therefore it is wise in man to name all novelty invention.*

—*Proverbial Philosophy*; TUPPER.

1540.—Pins were brought from France and first used by Queen Catherine Howard. 1543.—Pins were first made in England.

1818.—Shoe pegs were introduced.

1824.—Pins were first manufactured by machinery under an American patent.

1838, March 8.—Stillman Williams Robinson was born. He invented a photograph-trimmer, the Templet odontograph, a wire grip fastening machine, a boot and shoe nailing machine and iron pling and substructure machinery.

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MEMORANDA AND DIARY.

## WILLIAM THOMSON.

d. *June 25, 1824.*

d.

English mathematician. He advanced mathematical theories of heat, electricity and magnetism, and established the dissipation of energy, the idea of electric images and the solution of the problem of telegraphing through a submarine cable. He contributed more to the ultimate success of the Atlantic Cable than any other scientist. He invented an instrument for receiving the messages called the "mirror instrument" and an apparatus to receive and record the message, the "syphon recorder." He introduced the method of deep-sea sounding by a steel pianoforte wire and devised lighthouse signals. He predicted the level of the tides in all parts of the world. Wireless telegraphy commenced with his announcement in 1853 of the oscillatory character of a Leyden-jar discharge and his formulas for determining the time and amplitude of the waves.

*The lamp-light falls on blackened walls,  
And streams through narrow perforations;  
The long beam trails o'er pasteboard scales,  
With slow decaying oscillations.  
Flow, current, flow! set the quick light flying!  
Flow, current, answer, light spot! flashing, quivering,  
—Thomson's Galvanometer: J. CLERK MAXWELL.*

1853.—James B. Lindsay maintained that wireless telegraphy was possible. In 1854 he successfully telegraphed without wires across a stretch of water 500 yards wide.

## WILLIAM FOTHERGILL COOKE.

b. 1806.

d. *June 25, 1879.*

English electrician. Entered into partnership with Wheatstone in 1837, and their first patent was for improvements in giving signals and sounding alarms in distant places, by means of electric currents transmitted through electric circuits. In 1845 they succeeded in producing the single-needle apparatus and from that time the electric telegraph became a practical instrument.

*Is Learning your ambition?  
There is no royal road;  
Alike the peer and peasant,  
Must climb to her abode;  
Who feels the thirst for knowledge  
In Helicon may stake it,  
If he has still the Roman will,  
To "find a way, or make it!"*

—JOHN G. SAXE.

1747.—Watson showed the transmission of electricity by an insulated wire.

1809, August 29.—An electric telegraphic machine was exhibited at Munich, Bavaria, by Sommering.

1816.—The electric telegraph, with index and clock-works, was invented by Sir Francis Ronalds.

1836, June.—Prof. Charles Wheatstone constructed an electromagnetic apparatus; it carried 30 signals through nearly four miles of wire.

1837.—Wheatstone and Cook claimed to have discovered the electric telegraph.

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MEMORANDA AND DIARY.

JOSEPH MICHEL MONGOLFIER.

- b. 1740. *d. June 26, 1810.*  
He and his brother Stephen are the French inventors of the balloon (1783); they were successful paper manufacturers near Lyons. The first public exhibition was made at Annonay, near Lyons, June 5, 1783; and on October 15, 1783, the first human being ascended in a balloon. They made various mechanical inventions, among them the well known "hydraulic ram," in which the impulse of a large mass of water descending from a small height is made available to raise a small mass of water to a great height.

*Sylphs! your soft voices, whispering from the skies,  
Bade from low earth the bold Mongolfier rise;  
Outstretch'd his buoyant ball with airy spring,  
And bore the Sage on levity of wing:—  
Where were ye, Sylphs! when on the ethereal main  
Young Rostere launch'd, and call'd your aid in vain?*  
—Botanic Garden: DR. DARWIN.

1782, November.—Joseph Michel Montgolfier made the first balloon; it was a silken bag, which ascended at Annonay, by heated air.

1772.—Whitehurst, a watchmaker of Derby, England, built the first water ram used in England, but the flow in the supply pipe was caused by opening and closing a stop-cock by hand.

1797, December 13.—Boulton, the partner of Watt, patented a hydraulic ram of the same pattern as Montgolfier's.

SAMUEL CROMPTON.

- b. December 3, 1753. *d. June 26, 1827.*  
American inventor of the mule spinning-machine, in 1779. By rollers, he succeeded in combining Arkwright's spinning-jenny and Hargreaves' spinning-jenny into his mule, the construction of which occupied five years.

*The force of genius could no farther go,  
To make a third he joined the other two.*

*A weaver sat by the side of his loom,  
A-flinging his shuttle fast;  
And a thread that would wear till the hour of doom  
Was added at ev'ry cast.  
His warp had been by the angels spun,  
And his weft was bright and new,  
Like threads which the morning undraids from the sun,  
Jeweled all over with dew.*

*Like warp and woof all destinies are woven fast,  
Linked in sympathy like the keys of an organ vast.  
Pluck one thread, and the web ye mar; break but one  
Of a thousand keys, and the paining jar through all will run  
—My Soul and I.*

1805.—Spinning by the distaff was introduced.

1830.—The spinning-wheel was invented by Jurgem at Wolfenbuttel, Brunswick.

1830.—Spinning-wheel is also said to have been invented at Nuremberg.

Barton H. Jenks improved almost every machine used in cotton and woollen machinery. He perfected the step, the bolster, the bobbin and the spindle.



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MEMORANDA AND DIARY.

CHRISTIAN GOTTFRIED EHRENBERG.

*b. April 19, 1795. d. June 27, 1876.*

German naturalist. Celebrated for his microscopic researches. His first writings were treatises on fungi and other cryptogamous plants. In his works he announced that cretaceous and calcareous strata and large portions of mountains are composed of the skeletons of infusoria or microscopic organisms. His "Mikro-Geologie" (1854-1856) is among his most important works. He was first to explain that the blood-red color of the Red Sea was due to microscopic algæ, the red Trichodesmia; and that the silicious rock, Tripolis, is composed almost wholly of the skeletons of Sufusoria, not unlike those of chalk.

*Great as they are, what numbers these surpass,  
Huge, as Leviathan, to that small race,  
Those twinkling multitudes of little life,  
He swallow'd unperceiv'd! stupendous these!  
Yet what are these stupendous to the whole?  
As particles, as atoms, unperceiv'd;  
As circulating globules in our veins;  
So vast the plan! fecundity divine!  
Ereub'rant source! perhaps I wrong thee still.  
—Night Thoughts: YOUNG.*

1730, December 8.—1799, February 7.—Johann Hedwig lived. He made important discoveries with the microscope. He was the first to discover the true parts of generation in mosses.

ROBERT RECORDE.

*b. about 1510. d. June 27, 1558.*  
Cambridge M. D., 1545.

English mathematician. He was the founder of an English school of mathematical writers. He was the first writer in English on arithmetic, geometry and astronomy, and the first to introduce algebra into England. His claims to originality of invention rest on his discovery of the method of extracting the square root of multinomial algebraic expressions, and on his having been the first to use the present sign of equality, i. e., " $=$ ". He was a skillful doctor, an able lawyer, a philologist and a profound mathematician, yet he died in misery in the debtors' prison in London.

*There is a relation between the hours of our life and the centuries of time. As the air I breathe is drawn from the great repositories of nature, as the light on my book is yielded by a star a hundred millions of miles distant, as the pulse of my body depends on the equilibrium of centrifugal and centripetal forces, so the hours should be instructed by the ages, and the ages explained by the hours.*

—History: EMERSON.

1540-1603, February.—Francis Vieta lived. He was the creator of modern algebra. He rendered algebra a purely symbolic science; and he is said to have been the first to represent the known quantities by symbols. He also made important discoveries in trigonometry.

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MEMORANDA AND DIARY.

SAMUEL W. CHUBBECK.

- b. 1800. *d. June 28, 1875.*
- American inventor and manufacturer of telegraph instruments, the first one ever made having been constructed by him, it is said. One of his inventions was that by which the paper on the reel could be used forty times. The circuit-closer attachment to the key and the famous "pony" sounder were also invented by him.

*Around the magnet, Faraday  
Was sure that Volta's lightning plays;  
But how to draw them from the wire?  
He drew a lesson from the heart,  
'Tis when we meet, 'tis when we part,  
Breaks forth the electric fire.*

—HERBERT MAYO.

1833.—Electro-magnetic telegraph machines were invented by Gauss and Weber. The first telegraph actually constructed and used was set up by Gottingen.

1837.—Samuel F. B. Morse first publicly exhibited his telegraph. 1840.—He obtained his first patent on the telegraph. 1843.—Davy took out a patent for the application of electro-chemical marks to telegraphic purposes.

1847.—W. E. Ayrton was born. He introduced experiments for determining the location of a fault in the telegraph line by an electrical test at one end. With Prof. Perry, he is the joint inventor of the well known ammeters, voltmeters, electric power meter, ohmmeter, dispersion-photometer, transmission-dynamometer, dynamometer coupling, governed electric motor, oblique coiled dynamo machine and secobimeter.

JEAN JACQUES ROUSSEAU.

- b. June 28, 1712. *d. July 2, 1778.*
- Swiss philosopher and writer; called the Father of Modern Democracy. He was the son of a watch-maker and his early life was full of adventures. His physical infirmities, his fondness of paradox and his hostility to conventional maxims, combined to render him eccentric and singular in his manners and mode of living. He produced in 1753 a "Discourse on the Origin of Inequality Among Men," in which he maintains that all men are born equal.

*O mortal man, who livest here by toll,  
Do not complain of this thy hard estate;  
That like an emmet thou must ever moul,  
Is a sad sentence of an ancient date;  
And, certes, there is for it reason great;  
For, though sometimes it makes thee weep and wail,  
And curse thy star, and early drudge and late,  
Withouten that would come a heavier bate,  
Loose life, unruly passions, and diseases pale.*

—*The Castle of Indolence*; THOMSON.

639 B. C.—Thales (Seven Sages), founder Ionian school of philosophy, born at Miletus. He died in 543.

95 B. C.—Lucretius was born. He was a Roman poet, and left one work, "On the Nature of Things," in which he illustrates the doctrines of Epicurus.

169.—Diogenes Laertius wrote a history of philosophy in ten books.

950.—Alfarabius, writer and scientist, linguist, compiled the first encyclopedia. He was familiar with all branches of science. He died at Damascus.

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MEMORANDA AND DIARY.

THOMAS HENRY HUXLEY.

b. May 4, 1825.

d. June 29, 1895.

English physiologist and naturalist. Discovered protoplasm. Among his principal works are "History of the Oceanic Hydrozoa" (1857); "Man's Place in Nature" (1863); "Manual of the Anatomy of Vertebrated Animals" (1871).

*Knowest thou what wove yon woodbird's nest  
Of leaves and feathers from her breast?  
Or how the fish outbuilt her shell,  
Painting with morn each annual cell?*  
—*The Problem*; EMERSON.

*Flower in the crannied wall,  
I pluck you out of the crannies;  
Hold you here, root and all, in my hand,  
Little flower—but if I could understand  
What you are, root and all, and all in all,  
I should know what God and man is.*  
—TENNYSON.

*There is learning enough in the world just now to  
solve any question that may arise; but there isn't  
wisdom enough, put it all together, to tell what  
makes one apple sweet and the next one sour.*  
—UNCLE ESEK.

1840.—Schleiden and Nägeli began the real study of cells and their development.

1846.—Mohl is said to have first assigned the name "protoplasm" to cell contents.

1899.—Peters described an ovum of ten days' development.

PYTHAGORAS.

b. 580 or 586 B. C.

d. 497 or 500 B. C.

Greek philosopher, astronomer and geometer. Founder of the school called the "Italic" and established a school of philosophy at Crotona, Magna Græcia. He taught geometry at Samos and was the first to discover, or at least to demonstrate, the great geometrical truth, that the square described on the hypotenuse of a triangle is exactly equal in area to the two squares described on the other two sides. He also computed and made the first multiplication table.

*Learning by study must be won;  
'Twas ne'er entail'd from sire to son,  
—GAY'S FABLES.*  
*As great Pythagoras of yore,  
Standing beside the blacksmith's door,  
And hearing the hammers as they smote  
The anvils with a different note,  
Stole from the varying tones, that hung  
Vibrant on every iron tongue,  
The secret of the sounding wire,  
And formed the seven-chorded lyre.*  
—*To a Child*; LONGFELLOW.

408 B. C.—The History by Herodotus appeared. 1770, August 27—1831, November 14.—George Wilhelm Friedrich Hegel lived. His system of philosophy is regarded as the completion of the great philosophic edifice of which Kant had laid the foundation. It is reputed to be the most comprehensive and analytic of pantheistic schemes.

1806.—Fessenden wrote "The Modern Philosopher or Terrible Tractoration."

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MEMORANDA AND DIARY.

## HYPATIA.

*b. about 355.*

Daughter of Theon, a celebrated philosopher and mathematician. He instructed her in the most abstruse sciences, in philosophy, geometry, astronomy, and other mathematics. She was one of the most learned persons of her time, and succeeded her father in the government of the school of Alexandria; she taught where Ammonius, Herocles and many other great men had taught before her and at a time when men of learning abounded in Alexandria. In 415 five hundred monks attacked the governor, dragged Hypatia from her chair, tore her to pieces and burned her limbs.

*Reason progressive, instinct is complete;  
Swift instinct leaps; slow reason feebly climbs.  
Brutes soon their zenith reach; their little all  
Flows in at once; in ages they no more  
Could know, or do, or covet, or enjoy.*

—*Night Thoughts*—*The Complaint*: YOUNG.

Theon, the father of Hypatia, left the following problem :  
 $\sqrt{4500^2 = 67^{\circ} 4' 55''}$ .

430 B. C.—Hippocrates, of Chios, solved the problems of mean proportionals and contributed much to the geometry of the circle.

428-347 B. C.—Archytas, of Tarentum, advanced the theory of proportion and wrote on the duplication of the cube.

300-370 A. D.—Pappus wrote *Arithmetical Collections*, a work treating centres of gravity and centres of inertia.

## PTOLEMY.

*b. about 100 A. D.*

*d. about 161.*

Greek astronomer, geographer and mathematician. He maintained that the earth was a sphere and that the sun and stars revolve daily around the earth, which is fixed in the centre of the universe. His astronomical theory is called the Ptolemaic system. He wrote a work on general geography, which for ages was the chief authority on that subject and did not become obsolete until the fifteenth century. He gave special attention to the determination of the latitudes and longitudes of places by mathematical process, but neglected the descriptive part of geography.

*Reas'ning at every step he treads,  
Man yet mistakes his way,  
While meaner things, whom instinct leads,  
Are rarely known to stray.*

—COWPER.

1008.—Junis Ebn made astronomical tables.

1473, January 19.—1543, May 24.—Nicholas Copernicus lived. 1517, he discovered the true system of the universe. He completely overthrew the Ptolemaic theory of the universe. His great work is entitled "*De Revolutionibus Orbium Caelestium*."

1790.—An immense stone was found in Mexico engraved with the astronomical cycle of the Aztecs.

1801, January 1.—Karl F. Gauss invented his method of calculating the position of heavenly bodies, enabling astronomers to relocate lost planets.

1838.—Herschel's *Outline of Astronomy* was published.



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MEMORANDA AND DIARY.

## ARISTAGORAS.

- b. *d.* 497 B. C. (*about*).  
The tyrant of Miletus. Flourished about 500 B. C. He made a map of the eastern part of the Mediterranean Sea, with the contiguous districts of Europe and Asia. His object was to show the route between Sparta and Susa (the Persian capital), hoping to induce Cleomenes, King of Sparta, to attack the Persian capital. The map was considered a good specimen of the constructions employed in those times.

*There take thy stand, my spirit;—spread  
The world of shadows at thy feet;  
And mark how calmly, overhead,  
The stars like saints in glory meet;  
While hid in solitude sublime,  
Methinks I muse on Nature's tomb,  
And hear the passing foot of Time  
Step through the gloom.*

—JAMES MONTGOMERY.

*The patient sage, who, by his lamp's faint light,  
O'er chart and map spent the long silent night.*

—William Wallace: JOANNA BAILE.

1678.—Odometers, or road-measurers, were improved by Butterfield.

1756.—James Watt was the maker of mathematical instruments for the University of Glasgow. 1760.—He invented the shot-tower.

1783.—General Roy began the trigonometrical survey of the coast.

## STRABO.

- b. 60 B. C. (*about*). *d.* 24 A. D. (*about*).  
Greek geographer and explorer. He wrote a work on geography which was attractive and adapted to general use. To the descriptions of countries he added notices of the customs and former history of the people, enlivened by the anecdotes, traditions and comparisons which gave interest to positive geography. His work is highly prized as an animated, broadly conceived and skillfully executed picture of the world as known to the ancients.

*Men with adventurous keels through unknown seas  
Have found their perilous way; and, unconfined,*

*Roved through strange lands, and dared the deadly breeze*

*\*Of deserts—adding to the stores of mind.*

*They have sought deep into the earth—have sought*

*To rend all mystery from earth to sky;*

*Making far worlds familiar unto thought—*

*Confering power on the mind's sov'reignty.*

—Sonnet: RICHARD HOWITT.

Between 300–200 B. C.—Pytheas lived. He sailed to the western and northern parts of Europe and wrote an account of his discoveries. He is believed to have circumnavigated Britain.

4th Century.—The compass was used by mariners on the Indian Ocean.

1420.—Plane charts and the mariner's compass came into use.

1522, September 7.—Magellan's ship completed the circumnavigation of the globe.



I watch the mowers as they go  
Through the tall grass, a white-sleeved-row;  
With even stroke their scythes they swing,  
To tune their merry whistles long;

Move logs and staves, and mow the hay;  
Foot and toe, and hand and hand;  
Reel and reel, the merry mowers,

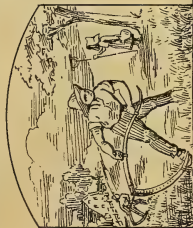
In a close and hurdy band,  
Move together, merry mowers,

With your circling, glittering steel,  
Till the hot sun turn and weaken,  
Till the starchest flag and reel.

The grain stalk bows his bristling head,  
As I clash and clash along;

The stubble it bends beneath my tread,  
The stacker's yellow tent is spread,  
And the hills throw back my song.

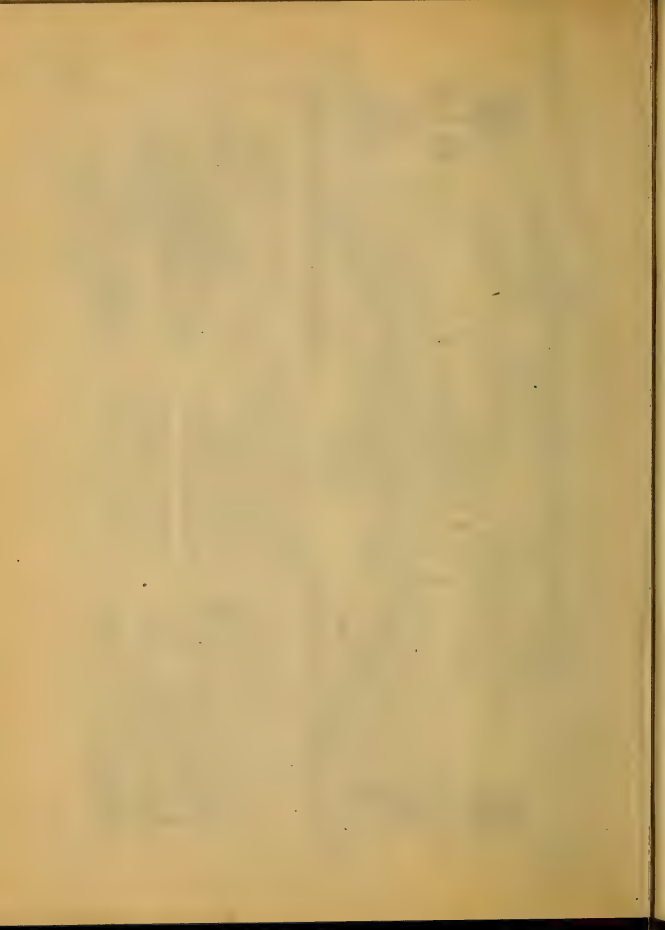
As we dash and dash and glide and run;  
And the world will eat when our work  
is done.



HALF MACHINE WITH  
SCYTHES



TWENTY MACHINE  
SCYTHES



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FRIDAY.

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MEMORANDA AND DIARY.

WILLIAM GASCOIGNE.

b. 1612.

d. July 2, 1644.

English astronomer; a striking instance of genius in early youth. He was the first to utilize the principle that a convex eye-glass of a telescope forms an image of the object in the focus of the object-glass, by placing there crossed filaments to mark the central axis or "line of collimation" of the telescope. He invented the micrometer. These two improvements are the most important which have been made in astronomical and geodetical instruments since the invention of the telescope.

*And thus had pass'd from its unequal frame  
A soul of fire; a sun-bent eagle, stricken  
From his high soaring down; an instrument  
Broken with its own compass! Oh, how poor  
Seems the rich gift of genius when it lies,  
Like the adventurous bird that hath outflown  
His strength upon the sea, ambition wreck'd!  
A thing the thrush might pity, as she sits,  
Brooding in quiet on her lonely nest.*

—*The Dying Alchemist*: N. P. WILLIS.

200-100 B. C.—Hypsicles the supposed author of book XIV. of Euclid's Elements, lived. His work on Risings is the earliest Greek work dividing a circle into 360 degrees.

177-100 B. C.—Heron of Alexandria, called Heron the Elder, is supposed to have invented the Dioptra, which, according to Venture, were instruments resembling our modern theodolites.

985.—Astronomers had a sextant whose radius was 59 feet 9 inches.

THOMAS HARRIOT.

b.

1560.

d. July 2, 1621.

English mathematician. Sir Walter Raleigh assisted him in the study of the mathematics. His "Artis Analyticæ Praxis" was printed after his death; and it is put beyond all doubt that Descartes stole from it, without acknowledgment, those improvements in algebra which he published as his own.

*Therefore, if any young man have embarked his life in the pursuit of Knowledge, let him go on without doubting or fearing the event; let him not be intimidated by the cheerless beginnings of Knowledge, by the darkness from which she springs, by the difficulties which hover around her, by the wretched habitations in which she dwells, by the want and sorrow which sometimes journey in her train; but let him ever follow her as the Angel that guards him, and as the Genius of his life. She will bring him out at last into the light of day, and exhibit him to the world comprehensive in acquirements, fertile in resources, rich in imagination, strong in reasoning, prudent and powerful above his fellows in all the relations and in all the offices of life.*

—*Pleasures of Knowledge*: SYDNEY SMITH.

1st Century.—Aryabhata or Aryabahr, Hindoo mathematician and astronomer, was the earliest known algebraist.

240-330 A. D.—Diophantus introduced algebraic equations expressed by symbols; if not the inventor of algebra, he was at least the author of the oldest extant treatise on the subject.

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MEMORANDA AND DIARY.

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## ANAXAGORAS.

*b. about 500 B. C.*

Greek philosopher. He maintained that this vast universe was composed of similar particles; that the sun was a mass of fire much larger than Peloponnesus; that the moon was inhabited; and that the supreme happiness of man consisted in contemplation.

*O blindness to the future! kindly given,  
That each may fill the circle mark'd by heaven;  
Who sees with equal eye, as God of all,  
A hero perish, or a sparrow fall,  
Atoms or systems into ruin hur'd  
And now a bubble burst, and now a world.*

—*Essay on Man*: POPE.

*While those laborious crowds  
Ply the tough oar, Philosophy directs  
The ruling helm; or like the liberal breath  
Of potent heaven, invisible, the sail  
Swells out, and bears the inferior world along.*

—*Philosophy*: THOMSON.

161 B. C.—Philosophers and rhetoricians were banished from Rome.

1672.—The experiments of Jean Richer led Newton to prove the earth to be in the shape of an oblate spheroid. He was elected a member of the Royal Society. 1674.—He made discoveries in colors.

1852.—The gyroscope was invented by Prof. Fessel of Cologne. It was a rotatory apparatus exhibiting the combined effects of the centrifugal and centripetal forces, and of the cessation of either, illustrating the great law of gravitation.

## ADRIEN AUXOUT.

*b. 1630. d. 1692.*

French mathematician, astronomer and instrument maker. Inventor of the movable wire micrometer; published a "Treatise on the Micrometer" (1667). He shares with Picard the honor of having applied the telescope to graduated instruments or quadrants.

*The moon, whose orb,  
Through optic glass, the Tuscan artist views  
At evening from the top of Pesele,  
Or in Valdarno, to descry new lands,  
Rivers or mountains, in her spotty globe.*

—MILTON.

*The one serviceable, safe, certain, remunerative,  
attainable quality in every study and every pursuit  
is the quality of attention. My own invention, or  
imagination, such as it is, I can most truthfully  
assure you, would never have served me as it has  
but for the habit of common-place, humble, patient,  
daily, toiling, arduous attention.*

—DICKENS.

1676.—Edmund Halley proved the motion of the sun around its own axis. He observed the transit of Mercury.

1678.—Newton applied mechanics to astronomy, parallelism of forces and laws of motion.

1780.—Joseph Louis Lagrange investigated the libration of the moon.

1739, August 28.—Herschel completed his great reflecting telescope at Slough, near London. He discovered two satellites of Saturn; 1790, two others; 1794, two more.



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MEMORANDA AND DIARY.

FRANCIS BARBER OGDEN.

b. *March 3, 1783.*

d. *July 4, 1857.*

American inventor. Is credited with having first applied the important principles of the expansive power of steam and right angular cranks in marine engines. In 1813 he received a patent for low-pressure condensing engines with two cylinders, the steam working expansively and the cranks being adjusted at right angles, and in 1817 the first engine ever constructed on this principle was built by him in Leeds, Yorkshire. The first propeller in the waters of the United States was the "Robert F. Stockton," an iron boat built at Liverpool under the superintendence of Mr. Ogden.

*With furnace fierce in forge and mill,  
And steamships on the foam,  
And trains that sweep through vale and hill,  
And roaring fires at home,  
In warmth and wealth while we rejoice,  
Nor heed the risk we run,  
Geology, with warning voice,  
Says, 'Coat will soon be done.'  
Then forge and mill must all stand still,  
And trains no longer roll,  
No longer float the swift steamboat;  
Oh! what shall we do for Coat?*

—WILLIAM J. MACQUORN RANKINE.

1698.—Captain Savery described his plan of paddle wheels for propulsion of ship in a calm to be worked by the crew. 1786-87.—Rumsey and Fitch applied steam to navigation.

WASHINGTON MONUMENT.

Corner-stone laid, 1848, with Masonic rites. The work proceeded until 1854, when it ceased for want of funds. In 1880 it was resumed by the government and was completed in 1884. It is a white obelisk, 555 feet high, being the loftiest structure in the world except the Eiffel tower in Paris. The exterior is of crystal Maryland marble.

*Oh, pure, white shaft upspringing to the light  
With one grand leap of heavenward reaching might,  
Calmly against the blue forevermore  
Lift thou the changeless type of souls that soar  
Above the common dust of sordid strife  
Into the radiant ether of a life  
Shepherded by the vastness of eternity.  
A hero's quickening spirit tisseth thee  
In those vast fields of light, sublime, alone,  
High commune holdest thou with the young day,  
With sunset's glowing heart ere twilight gray  
Hath stilled its throbbing fires, and with dim night  
That folds thee softly in the silver light  
Of many a dreaming moon. In majesty  
Serenely, like the great name enshrined in thee,  
Thou dost defy the all destroying years.  
Smite with thy still rebuke our craven fears!  
Point us forever to the highest height,  
And in our Nation's peril hours shine white  
With thy mute witness to the undying power  
Of the high soul that lives above the hour!*

—The Washington Monument: JULIA LARNED.

The heights of some of the great structures are as follows: Bartholdi Statue, 324; Strasbourg Cathedral, 495; Cologne Cathedral, 514, and St. Peter's, Rome, 434 feet.

1904.

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MEMORANDA AND DIARY.

WILLIAM JOHN MACQUORN RANKINE.

b. July 5, 1820.

d. December 24, 1872.

Scottish civil engineer; employed on river improvement, water-works, and on the Dublin and Drogheda Railway. He devised Rankine's method of "setting out curves" by deflections from the tangent. From 1848 to his death he was engaged in the study of molecular physics. He, with others, worked out the mechanical theory of heat. In 1853, with James Napier, he patented a new form of air engine. In 1856 he invented some remarkable methods connected with "Transformation of Structures." He is the author of "A Manual of Applied Mechanics" (1859) and "A Manual of Civil Engineering" (1862).

*A mathematician fell madly in love  
With a lady, young, handsome and charming;  
By angles and ratios harmonic he strove  
Her curves and proportions all faultless to prove,  
As he scrawled hieroglyphics alarming.  
He measured with care, from the ends of a base,  
The arcs which her features subtended;  
Then he framed transcendental equations to trace  
The flowing outlines of her figure and face,  
And thought the result very splendid.*

No doubts of the fate of his suit made him pause,  
For he proved, to his own satisfaction,  
That the fair one returned his affection;—"because,  
"As every one knows, by mechanical laws,  
"Reaction is equal to action.

GEORGE BRUCE.

b. July 5, 1781.

d. July 6, 1866.

Scotchman and American type-founder. He and his brother David introduced stereotyping from England in 1812. They invented a planing machine for smoothing the backs of the plates and used mahogany shifting-blocks to bring the plates to the proper height. From 1822 George gave his whole attention to type-founding and made many improvements, cutting his own punches and making new and tasteful designs. With his nephew, David Bruce, Jr., he invented a type-casting machine that has stood the test of experience and is now in general use.

*Steady and slow, but still they grow,  
And words of fire they soon will glow;—  
Wonderful words, that without a sound  
Transverse the earth to its utmost bound,  
—The Printer's Song: J. C. PIERCE.*

"Let  $x$  denote beauty,  $-y$ , manners well-bred, —  
"  $z$ , fortune,—(this last is essential), —  
"Let  $L$  stand for love"—our philosopher said, —  
"Then  $L$  is a function of  $x, y, z$ ,  
"Of the kind which is known as potential.  
"Now integrate  $L$  with respect to  $d t$   
" (standing for time and persuasion);  
"Then, between proper limits, 'tis easy to see,  
"The definite integral Marriage must be:—  
"A very concise demonstration."

—The Mathematician in Love: WM. J. MACQUORN RANKINE.

1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

JOHN FLAXMAN.

b. July 6, 1755.

English professor of sculpture in the Royal Academy. While at Rome he made about eighty designs from the Iliad and Odyssey. He was afterwards engaged to illustrate, in the same manner, the works of Dante for Thomas Hope, and Æschylus for the Countess of Spencer. He also made illustrations of Hesiod. He is considered to have acquired a higher reputation than any artist of England, excepting Sir Christopher Wren and Sir Joshua Reynolds. He has erected several monuments in Westminster Abbey and he designed a model of the shield of Achilles.

*To find man's veritable stature out  
Erect, sublime,—the measure of a man,  
And that's the measure of an angel.*

—Aurora Leigh: MRS. BROWNING.

*Genius easily heus out its figure from the block,  
but the sleepless chisel gives it life.* —WILLMOTT.

*Observe, without labor nothing prospers.*

—SOPHOCLES.

498-431 B. C.—Phidias, the greatest sculptor, lived.

487-433 B. C.—Phidias made a colossal statue of Jupiter, in gold and ivory (one of the seven wonders of the world), for the temple of Jupiter at Olympia.

GOTTFRIED WILHELM VON LEIBNITZ.

b. July 6, 1646.

d. November 14, 1716.

German philosopher and mathematician. In 1676 he discovered the infinitesimal calculus. He believed God to be the supreme Reason of the universe, the first and last term in the series of efficient causes, as in that of final causes. Among his works are "New Essays of the Human Understanding" (about 1765); "Pre-Established Harmony" and "Monadologie" (1714).

*Higher! Earnestly breathes the student of philosophy and nature. He has a host of rivals; but he must excel them all. The midnight burns dim; but he finds light and knowledge in the lamps of heaven, and his soul is never weary, when the last of them is had by the splendors of the morning.* —Higher.

1692.—Leibnitz first used the term "function."

1718.—Johann Bernoulli defined the term "function" as used in its present sense.

1797.—Lagrange published his "theory of functions."

1856.—Duhamel gave the first rigorous demonstration of the principles of the infinitesimal calculus, eighty years after it was invented by Leibnitz and Newton. Napier, Pascal, Von Guericke, Leibnitz and Euler, profound mathematicians, also wrote on religious subjects.

1855.—Prof. Jacob Amster invented the polar planimeter, or mechanical integrator.

1904.

WEDNESDAY.

1904.

MEMORANDA AND DIARY.

JAMES VIGNOLA.

- b. 1507. *d. July 7, 1573.*  
 Modenese architect. His real name was Barozzio. He constructed various edifices at Bologna, Parma, Perugia and Rome; his master-piece is the Capra-malo palace. He was intrusted with the management of the works at St. Peter's after the death of Michael Angelo. He drew the designs of the Es-curial for the King of Spain and they were adopted in preference to those of twenty-two other artists. He wrote on Perspective and on the Five Orders.

*We cannot look at works of art but they teach us how near man is to creating. Michael Angelo is largely filled with the Creator that made and makes men. How much of the original craft remains in him, and he a mortal man! In him and the like perfecter brains the instinct is resistless, knows the right way, is melodious, and at all points divine.*  
 — *Poetry and Imagination*; EMERSON.

70 A. D.—Titus' Triumphal Arch was erected at Rome.

75 A. D.—Vespasian erected a temple to peace at Rome.

79 A. D.—The Colosseum of Rome was finished by Titus. This enormous building required three years for its erection and cost as much as would build a capital city. It was commenced by Vespasian.

79 A. D.—Pompeii, Herculaneum and Stabiae were destroyed; 200,000 lives were lost.

80 A. D.—The Laocoon group of statuary was produced.

JOSEPH MARIE JACQUARD.

- b. *July 7, 1752.* *d. August 7, 1834.*

French inventor of the Jacquard loom. He was self taught and engaged successfully in the trades of bookbinder, typefounder and cutter. In 1804 he received a prize for a machine for making nets, and he established a manufactory for figured weaving at Lyons, where he met with much opposition from workmen and manufacturers. Since his time the improvements which have been effected in self-acting looms for figured weaving have been numerous, but they have all been based upon his inventions.

*Gaze on that complicated loom—  
 Vast offspring of a mighty brain—  
 Where mimic buds and blossoms bloom,  
 That only lack the rich perfume  
 To match their kindred of the plain.  
 See on its fabric deft outspread  
 Each rainbow hue'd and silken thread;  
 The living colors gleam and glow,  
 And into life and beauty grow,  
 As the thin dectrous fingers throw  
 The shuttle across the loom.* — *The Weaver*.

1589.—William Lee invented the stocking-frame, an essential part of the loom.

1738.—John Ray invented the flying shuttle first used in woollen factories.

1790 (about).—John Duncan invented tambouring machinery which produced upon muslins ornamental flowers and figures.



1904.

THURSDAY.

1904.

MEMORANDA AND DIARY.

JAMES HARGREAVES.

- b. *d. April 1778.*  
English inventor. He contrived a carding-machine in 1760, and a spinning-jenny about 1764, which he patented July 12, 1770. He has been represented as merely the improver and not the inventor of the spinning-jenny. He effected in the carding-machine improvements which Arkwright claimed and in 1775 patented. In 1772 he applied the contrivance of a crank and comb to take wool off the cards in a continuous fleece, and in 1779 he invented the mule-jenny.

*Oft, to admire the niceness of her skill,  
The nymphs would quit their fountain, shade, or hill;  
Nor would the work, when finish'd, please so much,  
As, while she wrought, to view each graceful touch;  
Whether the shapeless wool she wound,  
Or with quick motion turn'd the spindle round,  
Or with her pencil drew the neat design,  
Pallas her mistress shone in every line.*

—Pallas and Arachne: OVID'S METAMORPHOSES.

1767.—The spinning-jenny was invented by James Hargreaves, an optician of Lancashire; it had eight spindles.

1769.—Richard Arkwright extended James Hargreave's principles for spinning by water-power, and applied a large and small roller to extend the thread, which he patented.

1771.—He introduced steam in the place of horse-power in his cotton-mill at Cromford, on the Derwent.

1774-79.—Samuel Crompton, an artisan, claimed to have invented the spinning-jenny or mule.

WILLIAM CROMPTON.

- b. *d. 1806.*  
American inventor. He was brought up as a hand-loom cotton-weaver and learned the trade of a machinist. He devised a loom for the manufacture of fancy cotton goods, patented November 23, 1837. In this loom one part of the warp was depressed while the other was lifted, thus securing more space for the passing of the shuttle. Another feature of it was a chain which, with its peculiar apparatus, operated the warp. Mosts of the woollen goods made in the U. S. are woven on looms of the Crompton type.

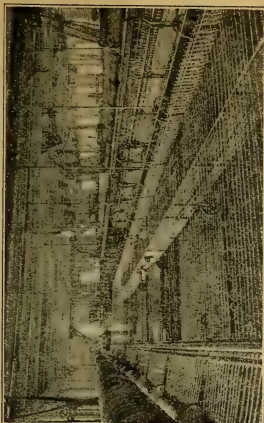
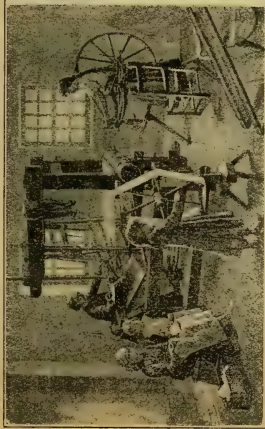
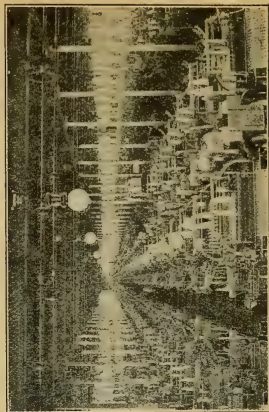
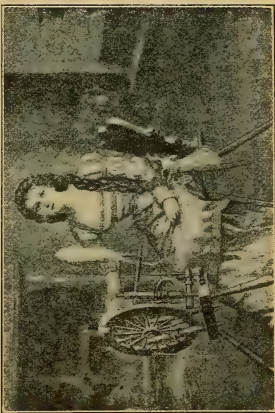
*Children of yesterday, heirs of to-morrow,  
What are you weaving—labor and sorrow?  
Look to your looms again! faster and faster  
Fly the great shuttles prepared by the Master;  
Life's in the loom! Room for it—Room!*

—MARY A. LATHBURY.

*Bobbin and spindle and shuttle; shuttle and bobbin and loom;  
Whirr, whirr, hurtle and stir, from now to the crack of doom;  
Yester ye came to the monster, to-day 'neath his flint-shod  
hoof,  
To-day for the strife in the warp of life, to-morrow the cross  
of the woof.*

*Laughter and hope and sorrow, sorrow and love and fear;  
Work, work, shiver and shirk, and life at its best but drear;  
And mind as ye sing o'er the warp ye've laid, or joy for the  
woof ye've planned,  
Unfinished it's left—the weaving weft ever falls to another's  
hand.*

—JO WILKES.





1904.

FRIDAY.

1904.

MEMORANDA AND DIARY.

## THOMAS DAVENPORT.

b. *July 9, 1802.*

American inventor. In 1835 he constructed the first electric railway at Brandon, Vermont. It was driven by an electro-magnetic engine. He discovered that a bolt of iron was drawn with great force into a helix of wire whenever an electric current traversed the coil. He constructed a small electric motor on this principle. In 1846 he devoted his attention to the application of the electric current to the strings of musical instruments. As applied by him, the impulsive and evanescent nature of the tone is changed at the will of the player into a full, perfect and prolonged vibration. In 1834 he invented his rotary motor. He started a paper in New York City called "The Electro-Magnet and Mechanics' Intelligencer," the first number of which appeared on January 18, 1840. He announced it as the first paper ever printed on a press propelled by electro-magnetism.

*Whoever has learned to read possesses the keys of Knowledge; and can, whenever he pleases, not only unlock the portals of her temple, but penetrate to the inmost halls and most sacred cabinets. A few dollars, the surplus of the earnings of the humblest industry, are sufficient to purchase the use of books which contain the elements of the whole circle of useful knowledge.*

—Pursuit of Knowledge: EDWARD EVERETT.

## HENRI ETIENNE SAINTE-CLAIRE.

b. *March 11, 1818.*d. *July 9, 1883.*

West Indian chemist. Studied in France and discovered anhydrous nitric acid in 1849, a new method of mineral analysis in 1853, and from 1854-1865 devoted his labors principally to researches upon the new metal, aluminum. He was the first to make artificial diamonds, which he did at an enormous cost, and he discovered new properties of several metals.

*Some find work where some find rest,  
And so the weary world goes on;  
I sometimes wonder which is best;  
The answer comes when life is gone.*

*Some eyes sleep when some eyes wake,  
And so the dreary night hours go;  
Some hearts beat when some hearts break;  
I often wonder why 'tis so.*

*Some wills faint where some wills fight,  
Some love the tent, and some the field;  
I often wonder who are right—  
The ones who strive or those who yield?*

*Some sleep on while others keep  
The vigils of the true and brave;  
They will not rest till roses creep  
Around their name above a grave.*

—I Often Wonder Why 'Tis So: FATHER RYAN.

1904.

SATURDAY.

1904.

MEMORANDA AND DIARY.

THOMAS WEDGWOOD.

b. May 14, 1771.

d. July 10, 1805.

English scientist. To him appears to be due the credit of first conceiving and publishing the idea of utilizing the chemical action of light for the purpose of making pictures. He first showed that a copy or silhouette of any object could be obtained when its shadow was thrown on a piece of white paper or leather which had been sensitized by being moistened with nitrate of silver. The primary end of his experiments was to obtain photographs in a camera obscura, but he was unsuccessful.

*O, star-eyed Science! hast thou wander'd there,  
To waft us home the message of despair?*

—Pleasures of Hope; CAMPBELL.

*Not from the things around us do we draw  
They light within: within the light is born  
The glowing rays of some forgotten morn,  
And added canons of eternal law*

—R. H. STODDARD.

1722.—The influence of solar rays on the crystallization of saltpetre and sal ammoniac was shown by Petit.

1837.—Photographs on paper were first made by Henry Fox Talbot.

1839.—Henry Fox Talbot first published his method of multiplying impressions by producing a negative photograph, from which any number of positive copies might be printed.

HENRY COET.

b.

1740.

d.

1800.

English manufacturer. To him belongs the merit of practically introducing the method of puddling and manufacturing iron which is now generally followed. He has sometimes been called the "Father of the Iron Trade." In 1783 he patented the so-called "grooved rolls," now known as "puddle rolls."

*Ah me! Experience (so we're told),  
Time's crucible, turns lead to gold;  
Yet what's experience won but dross,  
Cloud-gold transmuted to our loss?  
What but base coin the best event  
To the untried experiment?*

—A Familiar Epistle to a Friend; LOWELL.

*Before their Sovereign came, the Cyclops strove  
With eager speed to forge a bolt for Jove,  
Such as by Heaven's almighty Lord are hurled,  
All charg'd with vengeance, on a guilty World.  
Beneath their hands, tremendous to survey!  
Half rough, half form'd, the dreadful engine lay;  
Three points of ruin; three forks of hail conspire;  
Three arm'd with wind; and three were barbed with fire.*

—PITT.

3875 B. C.—Tubal-Cain invented a method of forging iron and brass weapons.

1642.—Iron castings were first made at the Sagus Iron Works, Massachusetts.

1730.—S. Nutt erected a forge in Coventry, Pa., and manufactured iron.



1904.

SUNDAY.

1904.

MEMORANDA AND DIARY.

## SAMUEL LUTHER DANA.

b. July 11, 1795.

d. March 11, 1868.

American chemist. His investigation in the bleaching of cotton led to the invention of the so-called "American system" of bleaching. He made many important improvements in the printing of cottons and the chemical processes involved.

*The essential element of success in every great undertaking is expressed by a single word; and that word is Earnestness. It contains the true secret of nearly all the wonderful successes which have astonished the world. It solves the problem of nearly all the heroes whose achievements are recorded on the pages of history, and whose names will live forever in the remembrance of mankind. In all past time, how few individuals do we find who have risen to any considerable distinction, and gained an enduring reputation, and become truly great, and have left their mark upon the age in which they lived, who were not earnest men.*

—Anonymous.

B. C.—The art of bleaching was practiced before the Christian era. The sun was the agent. In the early part of the eighteenth century Holland employed a solution of potash and a subsequent treatment with buttermilk or dilute sulphuric acid.

1785.—Bleaching properties of chlorine were discovered by Berthollet.

1799.—The dry chloride of lime or bleaching powder was patented by Charles Macintosh, of Glasgow.

1810, October 6.—A mill near Philadelphia made the first cotton-print goods printed from cylinders.

## WILLIAM ROBERT GROVE.

b. July 11, 1811.

d.

Oxford, 1835.

English lawyer, electrician, natural philosopher and inventor. About 1839 he invented the nitric acid battery which bears his name and effected the separation and recombination of water by the battery. In 1842 he maintained or suggested the doctrine that heat, light and electricity are mutually convertible and that heat is a mode of motion.

*Spartans, stoics, heroes, saints, and gods use a short and positive speech. They are never off their centres. As soon as they swell and paint and find truth not enough for them, softening of the brain has already begun.*

—The Superlative.

1839.—William Robert Grove constructed the nitric acid battery.

1840.—Alfred Smee's electric battery was first constructed.

1842.—Robert W. E. Bunsen constructed the first carbon battery.

1830.—Salvatore Del Negro made the first electric motor.

1854.—Soren Hjorth described the self-exciting dynamo, by which the field of the machine was reinforced by its own current.

1861.—Paccinotti invented the armature of an electric generator which Gramme greatly improved.

1904.

MONDAY.

1904.

MEMORANDA AND DIARY.

LOUIS JACQUES MANDE DAGUERRE.

b. *November 14, 1787.*

d. *July 12, 1851.*

French inventor; real discoverer of the photographic process. He demonstrated what others had surmised and succeeded in obtaining good pictures by the agency of light on sensitive plates. In 1840 portraits were first taken by the daguerreotype process in this country. The greatest triumph of his art was the diorama.

*The daguerreotype has fixed the most fleeting of our illusions, that which the apostle and the philosopher and the poet have alike used as the type of instability and unreality. The photograph has completed the triumph, by making a sheet of paper reflect images like a mirror and hold them as a picture. This triumph of human ingenuity is the most audacious, remote, improbable, incredible, — the one that would seem least likely to be regained, if all traces of it were lost, of all the discoveries man has made. It has become such an every-day matter with us that we forget its 'miraculous nature, as we forget that of the sun itself, to which we owe the creations of our new art.*

— *The Stereoscope and the Stereograph* : HOLMES.

1814.—Niepce, of Chalons, experimented with the camera at least ten years before Daguerre directed his attention to photography.

1827.—Niepce came to the United States and exhibited the results of his photographic process.

1829, December.—Niepce communicated the particulars of his photographic process to Daguerre.

ROBERT STEVENSON.

b. *June 8, 1772.*

d. *July 12, 1850.*

Scotch civil engineer. The Bell-rock lighthouse was begun by him in 1807 and completed in 1810. He practically inaugurated the Scottish lighthouse system, which is still conducted on the lines he initiated. He brought to perfection the catoptric or reflecting system of lighting, advocated the adoption of the dioptric or refracting system with its central lamp, and invented the intermittent and flashing lights. He designed a new form of suspension bridge, in which the roadway passes above the chains, and the necessity of tall piers is avoided. He suggested the rail used on modern railways. He invented the hydropneumoteur for procuring specimens of sea and river water, so largely used in estuarial and oceanic observations. He designed the magnificent eastern road approaches to Edinburgh.

*Bid Harbours open, Public Ways extend ;*

*Bid Temples, worthier of God ascend ;*

*Bid the broad Arch the dangerous flood contain,*

*The Mole projected, break the roaring main ;*

*Back to his bounds their subject sea command,*

*And roll obedient rivers through the land.*

*These honours, Peace to happy Britain brings ;*

*These are imperial works, and worthy kings.* —POPE.

1788.—Etienne Lenoir made the first lighthouse with parabolic reflectors.

1904.

TUESDAY.

1904.

MEMORANDA AND DIARY.

JAMES HARRIS ROGERS.

b. July 13, 1850.

d.

American electrician. An inventor of the secret telephone, also of the national improved telephone, and of the pan-electric system, comprising patents on electric motors, lights, telegraphs, telephones and telomorphs. He devised what he called "visual synchronism."

*Speech without action is a moral dearth.*

*And to advance the world is little worth;*

*Let us think much, say little, and much do,*

*If to ourselves and God we will be true;*

*And ask within,*

*What have I done of that I have to do?*

*Is conscience silent—say?*

*Oh! let my deeds be many and my words be few.*

—BULLEID.

1861, April 25.—A partially articulate electric telephone was exhibited at Frankfurt by Philip Reiss.

1870.—Cromwell Varley produced a musical telephone.

1874, July.—Prof. Bell made a successful electric telephone.

1877.—Elisha Gray filed a caveat for his telephone three hours after Bell's was filed.

1877, January.—Edison invented a carbon loud-speaking telephone.

1881, December.—At Washington, Alexander Graham Bell and Sumner Tainter produced sound by electricity and light.

1885, August.—A mechanical telephone, invented by A. A. Knudson and T. G. Ellsworth was announced.

JAMES BRADLEY.

b. 1692.

d. July 13, 1762.

English astronomer. His first sustained research was with the Jovian system. He calculated the tabular errors of eclipses and collated older observations, and discovered that the irregularities of the three inner satellites (rightly attributed to their mutual attraction) occurred in the same order after 437 days. He divined that the progressive transmission of light, combined with the advance of the earth in its orbit, must cause an annual shifting of the direction in which the heavenly bodies are seen, by an amount depending on the ratio of the two velocities. He announced his memorable discovery of the "aberration of light" in the form of a letter to Halley, read before the Royal Society January 9-16, 1729.

*'Tis by thy secret, strong attractive force,*

*As with a chain indissolubly bound,*

*Thy system rules entire; from the far borne*

*Of utmost "Herschel," wheeling wide his round*

*Of "eighty" years; to Mercury, whose disk*

*Can scarce be caught by philosophic eye,*

*Lost in the near effulgence of thy blaze.*

—THOMSON.

*Watch with nice eye the Earth's diurnal way,*

*Marking her solar and sidereal day;*

*Her slow nutation, and her varying clime.*

*And trace, with mimic art, the march of Time.*

—DARWIN.

1904.

WEDNESDAY,

1904.

MEMORANDA AND DIARY.

AARON ARROWSMITH.

b. July 14, 1750.

d. April 23, 1823.

English geographer; his maps are on a large scale and are finely engraved. Among them may be mentioned those of India, Alpine countries, Southern Italy and the environs of Constantinople.

*From east to west his glories he displays,  
And, like the sun, the Promised Land surveys.  
Fame runs before him, as the morning star,  
And shouts of joy salute him from afar;  
Each house receives him as a guardian god,  
And consecrates the place of his abode.*

*Another world is in his mind,  
Peopled with creatures of his kind,  
With hearts to feel, with minds to soar,  
Thoughts to consider and explore;  
Souls who might find, from trespass shrieve,  
Virtue on earth and joy in heaven.*

—CHRISTOPHER COLUMBUS: JOANNA BAILLIE.

876.—Greenland was discovered by Cunnbjorn. In 985, by Eric Raude.

1000.—New England was visited by Leif Ericsson with a crew of about thirty-five Icelanders. He arrived at Labrador, and explored the coast as far as Massachusetts, where he remained more than a year at Vinland.

1448.—The Azores were discovered.

1460.—The Cape de Verd Islands were discovered.

1486-1512.—Discoveries of Columbus and Vespucci.

1499.—Amerigo Vespucci made discoveries in America.

JEAN BAPTISTE ANDRE DUMAS.

b. July 14, 1800.

d. April 11, 1884.

French chemist who made researches on isomerisms, the law of substitutions, the atomic weights of elements, and other laws of chemical philosophy. His labors have contributed greatly to simplify the study of organic chemistry. He was associated with Liebig. He discovered anthracene in 1832.

*The eternal I  
Willed that the atoms diffused through space  
With velocities great should rush to their place;  
Each atom imbued in the eternal plan,  
With sentence, ready when life began.  
So words were formed; great globes with heat intense.  
Attraction, friction, motion, energies immense.*

Man, Whence and Where: JOHN P. MORRIS.

*The current of life runs ever away  
To the bosom of God's great ocean;  
Don't set your force 'gainst the river's course  
And think to alter its motion.*

*Don't waste a curse on the universe—  
Don't shrink at the trials before you;  
Don't butt at the storm with your puny form,  
But bend and let it go o'er you.*

—Looking for Flaws: ELLA WHEELER WILCOX.

3875 B. C.—Jabal was the first to erect a tent and to possess cattle as property.

1849.—A process for condensation of milk was invented by Gail Borden. In 1850 he prepared a meat biscuit.

1865.—The extract of meat was prepared by Liebig.



1904.

THURSDAY.

1904.

MEMORANDA AND DIARY.

WILLIAM THOMAS GREEN MORTON.

b. August 19, 1819.

d. July 15, 1868.  
American dentist. In 1841 he introduced a new solder by which false teeth could be fastened to gold plates. He studied chemistry and learned the anæsthetic properties of sulphuric ether. After experimenting upon himself, he administered it to a patient on September 30, 1846, producing unconsciousness, during which teeth were painlessly extracted. This new anæsthetic was first publicly administered on October 16, 1846, by Dr. Warren. From this operation dates the introduction of ethereal anæsthesia into general surgery. Dr. Morton obtained a patent for its use in the United States and in England. He called it "letheon." Various claimants opposed his right of discovery.

*It is a shameful thing to be weary of inquiry  
when what we search for is excellent.*

—CICERO.

*My curse upon thy venom'd sting,  
That shoots my tortured gums along;  
And through my lugs gies many a twang,  
We gnawing vengeance;  
Tearing my nerves wi' bitter pang,  
Like rack'ing engines!*

—BURNS.

1895, December 6.—Rudolf Fittig was born. He greatly enriched organic chemistry by his researches, more especially upon aromatic and unsaturated compounds. He discovered diphenyl in 1862.

CHIRON.

b.

d.

The most celebrated of the Centaurs, said to be the son of Saturn, or Cronos. Famous for his skill in surgery, music and hunting. He is credited with having first divided the starry sky into distinct constellations so early as 1420 B. C.

*Oh, how weak  
Is mortal man! how trifling! how confined  
His scope of vision! Puffed with confidence,  
His praise grows big with immortality,  
And he, poor insect of a summer's day,  
Dreams of eternal honors to his name,—  
Of endless glories and perennial bays!  
He idly reasons of eternity,  
As of the train of ages; when, alas!  
Ten thousand thousand of his centuries  
Are, in comparison, a little point  
Too trivial for account!*

—Vanity of Earthly Fame: HENRY KIRKE WHITE.

6th Century.—Alexander Tralianus wrote medical works.

1538.—N. Varoli of Bologna discovered optic nerves.

1560 (about).—Bartolommeo Eustachius discovered the Eustachian tube.

1661.—Marcello Malpighi (the father of microscopic anatomy) discovered the malpighian layer in dissecting the lungs.

1815-1898.—Sir William Jenner lived and discovered the difference between typhus and typhoid from observations on a thousand cases of fever, begun in 1847.

1904.

FRIDAY.

1904.

MEMORANDA AND DIARY.

HORACE SEE.

b. *July 16, 1835.*

d.

American engineer. He designed the machinery and superintended the construction of many well-known vessels, among which are United States cruisers "Philadelphia" and "Newark"; dynamite cruiser "Vesuvius"; gunboats "Yorktown," "Concord" and "Bennington"; yachts "Atalanta" and "Corsair." He designed and constructed the machinery for the Lehigh & Susquehanna planes at Wilkesbarre and the hoisting and pumping machinery for many of the largest anthracite coal mines.

*Here we sit in a thoughtful row,  
 Conning the wonderful things you know—  
 Grades and switches and loco-brakes,  
 Upper-deck stringers and garboard-strakes,  
 Roaring scuppers, full furnace-draught;  
 Thrustlock, cylinder, flaved tailshaft.  
 We have struggled, in very deed,  
 Master, thy tale is hard to read.*

—Kipling *Log*: KIPLING.

*The successful construction of all machinery depends on the perfection of the tools employed; and whoever is a master in the art of tool-making possesses the key to the construction of all machines. The contrivance and construction of tools must therefore ever stand at the head of the industrial arts.*

—C. BABBEAGE.

*The true Epic of our time is, not Arms and the Man but Tools and the Man—an infinitely wider kind of Epic.*

—I. CARLYLE.

SEXTUS JULIUS FRONTINUS.

b. *about 32.*

d.

103.

Roman surveyor, soldier, jurist and officer of the state; civil engineer and water commissioner of the City of Rome under Emperor Nerva in 97 A. D. Distinguished for having written several treatises on engineering subjects, among them "Treatise on Metes and Bounds"; "The Water Supply of the City of Rome," "Strategy"; and "Surveying."

.....*Ferguson, the modern historian of architecture, asserts that: "Where the engineer leaves off, the art of the architect begins. His object is to arrange the materials of the engineer, not so much with regard to economical as artistic effects, and, by light and shade and outline, to produce a form that in itself shall be permanent and beautiful." When competent writers find difficulty in defining the boundary between two professions which have been separated only in modern times, it will not be necessary for me to offer any excuse for considering the works of the ancient engineer-architects as a whole.*

Beginnings of Engineers: J. ELFRETH.

1613.—Martin Weigel, a mine boss of Freiberg, Saxony, made first attempt to blast rock with explosives.

1670.—Blasting introduced from Germany to England.

1829.—Blasts were fired by electricity by Moses Shaw, in New York.

1831.—Bickford invented his match and fuse for firing blasts.

1863.—Nitroglycerine first used for blasting.

1867.—Dynamite first used for blasting.

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MEMORANDA AND DIARY.

JOHN ROEBUCK.

1718.

- b. *d. July 17, 1794.* Scotch physician, experimental chemist and inventor. He invented a process of smelting iron by means of pit-coal and new methods of refining gold and silver, and the modern process of manufacturing vitriolic acid in leaden vessels in large quantities. He established a pottery for making white and brown ware. He then engaged in the manufacture of iron, and he was one of the first to revive the use of pit-coal in refining iron ore, which led to coal mining. Watt became his partner with the object of introducing his steam-engine into general use. The application of the engine to the pumping of the mines was slow, and the difficulties of the undertaking overwhelmed him and he transferred his entire interest in the steam-engine to Boulton.

*God of His infinite goodness hath made this country a very Granary for the supplying of Smiths with Iron, Cole, and Lime made with Cole, which hath much supplied these men with Corn also of late ; and from these men a great part, not only of this Island, but also of his Majesty's other Kingdoms and Territories, with Iron wares have they supplied, and Wood in these parts almost exhausted, although it were of late a mighty woodland country.* —*Metalum Martis* (1655): DUDLEY.

1746.—First iron rolling and slitting mill was erected in Thornbury, Pa.

1816.—First rolling mill to puddle iron and roll iron bars was built on Redstone Creek.

DE WITT CLINTON HASKIN.

b. *April, 1824.*

- d. July 17, 1900.* American engineer. In 1858 he began the construction of the California Pacific Railroad, completed in 1869. Originator of the Hudson River Tunnel (incomplete). He made the necessary borings at his own expense and determined the nature of the material penetrated—silt and quicksand, which required some different method of construction than those commonly practiced. He applied the pneumatic method on a scale which had not been employed before and demonstrated its possible use in tunnel construction.

*Press on ! if Fortune play thee false  
To-day, to-morrow she'll be true ;  
Whom now she sinks, she now exalts,  
Taking old gifts, and granting new.  
The wisdom of the present hour  
Makes up for follies past and gone ;  
To weakness strength succeeds, and power  
From frailty springs ! Press on, press on !*  
—*Press On*: PARK BENJAMIN.

1766.—James Brindley built the first tunnel in England, on the Duke of Bridgewater's canal, near Manchester.

1825 (about).—Isambard Kingdom Brunel began the first shaft of the Thames tunnel. The process of tunneling was suggested by the operations of the terebo.

1885, February 13.—The Mersey Tunnel, Liverpool, was opened.

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MEMORANDA AND DIARY.

ROBERT HOOKE.

b. *July 18, 1635.*

English experimental philosopher. He first inferred the rotation of Jupiter from a movement of a spot noted on May 9, 1664. In 1669 he attempted the telescopic determination of the parallax of a fixed star. He claimed to have discovered the law of gravitation before Newton. He invented an odometer, an otocousticon as an aid to hearing, a sounding machine and a reflecting quadrant. He first asserted the true principle of the arch, and described in 1684 a practicable system of telegraphy. In 1674 he constructed the first Gregorian telescope; propounded on March 19, 1675, a remarkable theory of the variation of the compass, and recommended for helioscopes the principle of diagonal reflections. His mind was so prolific that there was scarcely a discovery made in his time which he did not conceive himself entitled to claim as his own.

*There lie the inexhaustible magazines. The eternal rocks, as we call them, have held their oxygen or lime undiminished, entire, as it was. No particle of oxygen can rust or wear, but has the same energy as on the first morning.*

—*Farming*; EMBERSON.

38.—Seneca observed that gravitation was an innate power; also the action of the moon on the tides.

1875.—Johann G. Galle first advocated the use of planetoid observations to determine solar parallax.

PAUL AMBROSE OLIVER.

b. *July 18, 1830.*

d.

American manufacturer. In 1870 he established a powder-factory near Wilkesbarre, Pennsylvania, for the manufacture of explosives, using machinery of his own invention. His improvements include an incorporating-mill and a new mode of pressing and graining.

*When we are gone,  
The generation that comes after us  
Will have far other thoughts than ours.*

*You taught mysterious Bacon to explore  
Metallic veins, and part the dross from ore;  
With sylvan coal in whirling mills combine  
The crystal'd nitre, and the sulphurous mine;  
Through wiry nets the black diffusion strain,  
And close an airy ocean in a grain—  
Pent in dark chambers of cylindric brass,  
Stumbers in grim repose the sooty mass;  
Lit by the brilliant spark, from grain to grain  
Runs the quick fire along the kindling train;  
On the pain'd ear-drum bursts the sudden crash,  
Starts the red flame, and Death pursues the flash,  
Fear's feeble hand directs the fiery darts,  
And strength and courage yield to chemic arts.*

—*Botanic Garden*; DR. DARWIN.

800.—Marcus Graecus made gunpowder.

1200.—A kind of gunpowder was used for blasting in the Hartz mountains.

1320.—Roger Bacon had knowledge of gunpowder.



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MEMORANDA AND DIARY.

## EDWARD CHARLES PICKERING.

b. *July 19, 1846.*

d.  
Harvard, 1865.

American astronomer and physicist; director of Harvard Observatory. He described a new form of spectrum telescope, and invented in 1870 a telephone receiver. Since his appointment at Harvard his principal work has been the determination of the relative brightness of the stars, and he has prepared a catalogue giving the brightness of over four thousand stars. Since 1878 he has also made photometric measurements of Jupiter's satellites while they are undergoing eclipse, and of the satellites of Mars and other very faint objects.

*Oh! when the soul, no longer earthward weighed,  
Escorts tow'rd heaven on swift, seraphic wing—*

*Among the joys past man's imagining,*

*It may be one to scan, O! space displayed,  
Those wondrous works our blindness now debars—*

*The awful secrets written in the stars.*

—*The Star: Literary Gazette.*

1781.—Uranus was discovered by William Herschel.

1801.—New planet Ceres was discovered by Piazzi.

1802.—Planet Pallas was discovered by Heinrich Olbers.

1804.—Planet Juno was discovered by Harding.

1846.—Neptune was discovered by Johann G. Galle.

1846.—William R. Dawes discovered Hyperion, a satellite of Saturn. He also invented the "wedge" photometer.

## GEORGE KELLOGG.

b. *June 19, 1812.*

d.

American inventor. He has made many inventions, including a machine to make jack-chain at the rate of a yard a minute (1844); a dovetailing machine (1849); a type-distributor (1852); an obstetrical forceps (1858), and an adding apparatus (1869).

*The modern majesty consists in work. What a man can do is his greatest ornament, and he always consults his dignity by doing it.*

—CARLYLE.

*Who first invented work, and bound the free*

*And holiday rejoicing spirit down*

*To the ever-haunting impurity*

*Of business in the green fields and the Town—*

*To plow, toom, spade, and (oh! most sad!)*

*To this dry drudgery of the desk's dead wood?*

—LAMB AND HAZLITT.

1829, March 27.—John W. Revere explained his invention of galvanized iron at Lyceum of Natural History.

1846, December 19.—Ambrose Swasey lived. He invented and perfected the epicycloidal milling machine for producing the true theoretical curves of the teeth of gears, and a few years later he invented an entirely new process for generating and cutting spur gears.

1852.—Manufacture of galvanized iron was introduced.

1870, March 31.—Seth Boyden, inventor of malleable cast-iron hat-doming machine, died.

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• MEMORANDA AND DIARY.

## ALEXANDER HOMAN HOLLEY.

b. July 20, 1832. d. January 29, 1882.

American metallurgist. He went abroad with Zerah Colburn and studied foreign railway practice, and on their return they established "The Permanent Way and Coal-burning Locomotives of European Railways, with a Comparison of the Working Economy of European and American Lines, and the Principles upon which Improvement Must Proceed" (1858). It was shown that the operating expenses of an American railroad was one-third more than were those in England. Holley secured many patents, several in the Bessemer process; and of these, the detached converter-shell is important. He published "A Treatise on Ordnance and Armor" (1865).

*Rich in the nobler metal we,  
That guides the ship o'er the trackless sea—  
That digs the mine—that tills the plain—  
That bears and drives the flying train—  
That wealth in every shape bestows,  
And arms our hands against our foes.  
Man nor the elements can foil  
The children of the Iron soil.  
'Tis theirs to wield resistless might,  
Danger and toil, and death to slight,  
In every clime between the poles,  
With Iron frames and Iron souls.*

—IRON: WILLIAM J. MACQUORN RANKINE.

1857.—Steel rails were first made; malleable iron bars having been used up to this time.

## JOHN IRELAND HOWE.

b. July 29, 1793. d. September 10, 1876.

American inventor. In 1830-1831 he made a working model for the manufacture of pins; in 1838 a new "rotary machine" was invented by him, which he patented in 1840. He invented improvements in the methods used for "sheeting" pins, and was associated in the invention of means by which "mourning pins" were japanned.

*How many a rustic Milton has pass'd by,  
Shifting the speechless longings of his heart,  
In unremitting drudgery and care!  
How many a vulgar Cato has compelled  
His energies, no longer tameless then,  
To mold a pin, or fabricate a nail!*

—SHELLEY.

1560.—Sewing-needles were made by Chreening.

Needles were first sold in England in the reign of Queen Mary, and then they were made by a Spanish negro, who refused to divulge the secret of his art. They were first manufactured in England in 1566, by Charles Grouse, a German.

The pin was not known in England till toward the middle or latter end of the reign of Henry VIII.

1812.—The first pin factory in the United States was started in New York.

1838.—The first pin factory in the United States for making pins with solid heads was started at Birmingham, Coun.

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MEMORANDA AND DIARY.

HENRI VICTOR REGNAULT.

b. *July 21, 1810.*

French chemist and physicist. He wrote memoirs on the compressibility of elastic fluids, on the elastic forces of aqueous vapor at different temperatures, and on the laws and numerical data which enter into the calculations respecting the construction and power of steam-engines.

*The prevailing idea with young people has been the incompatibility of labor and genius, and, therefore, from the fear of being thought dull, they have deemed it necessary to remain ignorant. It would be an extremely profitable thing to draw up a short and well-authenticated account of the habits of study of the most celebrated writers with whose style of literary industry we happen to be most acquainted. It would go very far to destroy the absurd and pernicious association of genius and idleness, by showing that the greatest poets, orators, statesmen and historians have labored as hard as the makers or the arrangers of indexes.*

—*Labor and Genius*: SYDNEY SMITH.

1832.—Locomotives with a 70-mile per hour speed were built in U. S.

1891.—N. Y. Central R. R. established a world's record by running a train 436 miles, between New York and Buffalo, at rate of 61.56 miles per hour.

1893.—Another record by locomotive 999, with Empire State express train, running at rate of 112.5 miles per hour.

JOHN PICARD.

b. *July 21, 1620.*

French astronomer and mathematician. He first observed the phosphoric light in the barometric vacuum and he applied the telescope to the quadrant. He edited the "Connaissance des Temps"

from 1679-1683. He invented various adjustments and verifications of astronomical instruments, which produced a degree of accuracy theretofore unknown. He applied telescopic sights which had previously been used by William Gascoigne. He measured an arc of the meridian with approximate accuracy and thus furnished astronomers with a tolerably correct measure of the size of the earth at a time when it was of vital importance to astronomers. He is the inventor of the transit instrument and he proposed the seconds pendulum as a standard of measure.

CAYALIERI. *But the earth does not move.*MICHAEL ANGELO. *Who knows? Who knows?*

*There are great truths that pitch their shining tents*

*Outside our walls, and though but dimly seen*

*In the gray dawn, they will be manifest*

*When the light widens into perfect day.*

*A certain man, Copernicus by name,*

*Sometime professor here in Rome, has whispered*

*It is the earth, and not the sun, that moves.*

*What I beheld was only in a dream,*

*Yet dreams sometimes anticipate events.*

—*Michael Angelo*: LONGFELLOW.d. *July 12, 1683.*

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MEMORANDA AND DIARY.

BENN PITMAN.

b. July 22, 1822.

d.

English stenographer, brother of Isaac, who invented phonography. From 1843 till 1852 he lectured on the system throughout Great Britain, and helped largely in the compilation of his brother's text books. In 1855 he discovered the process of producing relief copper plates of engraved work by the galvanic process known as electrotypes. In connection with Dr. J. B. Burns he succeeded in producing stereotype plates by the gelatine process in photo-engraving.

*To be accurate, write ; to remember, write ; to know thy own mind, write.*  
*And a written prayer is a prayer of faith, special, sure and to be answered.*

—Proverbial Philosophy : TUPPER.

*Conceit is just as natural a thing to human minds as a centre is to a circle. But little-minded people's thoughts move in such small circles that five minutes' conversation gives you an arc long enough to determine their whole curve. An arc in the movement of a large intellect does not sensibly differ from a straight line.*

—The Autocrat of the Breakfast Table : HOLMES.

1837.—Phonography was invented by Isaac Pitman.

1867.—Typewriters were invented by Sholes and Glidden.

PIERRE LYONNET.

b. July 22, 1707.

d. Jan. 10, 1789.

Dutch anatomist, naturalist and engraver. He spent nearly his whole life studying one species of caterpillar, that which eats the willow, and about 1760 he published an "Anatomical Treatise on the Caterpillar," which Cuvier says is among the masterpieces of human industry.

*Nature never hurries ; atom by atom, little by little, she achieves her work. The lesson one learns in fishing, yachting, hunting or planting is the manners of Nature ; patience with the delays of wind and sun, delays of the seasons, bad weather, excess or lack of water—patience with the slowness of our feet, with the parsimony of our strength, with the largeness of sea and land we must traverse.*  
 —Farming : EMERSON.

*The landscape is an armory of powers, Which, one by one, they know to draw and use. They harness beast, bird, insect, to their work ; They prove the virtues of each bed of rock, And, like the chemist 'mid his loaded jars, Draw from each stratum its adapted use To drug their crops or weapon their arts withal.*  
 —Musketquad : EMERSON.

1773.—Henry Cavendish and others investigated electricity as developed in fishes.

1858.—The theory of natural selection was advanced by Charles Robert Darwin and Alfred Russell Wallace.



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FRIDAY.

1904.

MEMORANDA AND DIARY.

ISAAC MERRITT SINGER.

- b. *October 27, 1811.* *d. July 23, 1875.*  
 American inventor. He was a machinist and devoted himself entirely to improving sewing-machines. He succeeded in completing a single-thread, chain-stitch machine, for which he received a patent.

*It's none of your angular Wheeler things,  
 With steel-shod beak and cast-iron wings;  
 Its work would bother a hundred of his,  
 And worth a thousand! Indeed it is;  
 And has a way—you needn't stare—  
 Of combing and braiding its own black hair!*

*Mine is not one of those stupid affairs  
 That stands in a corner, with what-  
 And makes that dismal, head-achy noise,  
 Which all the comfort of sewing destroys;  
 No rigid contrivance of lumber and steel,  
 But one with a natural spring in the heel.*

—*The Sewing Machine.*

1768.—Hammond, a framework knitter of Nottingham, adapted his stocking-frame to the manufacture of lace.

1803.—The invention of a sewing-machine is ascribed to John Duncan; also an embroidery machine.

1824.—William H. Horstman introduced into the United States from Germany the use of plaiting or braiding machines and the Jacquard loom.

1847.—Factories for manufacture of sewing-machines were established in Massachusetts.

GASPARO ASELLI, or ASELLIO.

- b. 1580. *d.* 1626.  
 Italian anatomist. Discoverer of the lacteal vessels, July 23, 1622. The discovery was announced in a work entitled "On the Lacteal Veins" (1627).

*When I compare  
 What I have lost with what I have gained,  
 What I have missed with what attained,  
 Little room do I find for pride.*

*I am aware  
 How many days have been idly spent;  
 How like an arrow the good intent  
 Has fallen short or been turned aside.*

*But who shall dare  
 To measure loss and gain in this wise?  
 Defeat may be victory in disguise;  
 The lowest ebb is the turn of the tide.*

—*Loss and Gain.*

1622, July 23.—Gasparo Aselli, of Cremona, discovered the lacteals while dissecting a dog.

1649.—Olaus Rudbeck discovered the lymphatics.

1752.—Reaumer determined the character and effect of the gastric juices.

1855.—The laryngoscope, a mirror for examining the throat, was invented by Manuel Garcia.

1861.—Since this year absorbable catgut ligatures for cut vessels have been used in place of silk, which had to come away by ulceration.

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MEMORANDA AND DIARY.

## HEZEKIAH BRADLEY SMITH.

b. July 24, 1816.

d. November 3, 1887.

American inventor of wood-working machinery. In 1860 he engaged in the manufacture of window-blinds, and invented a machine that cut and cleaned forty mortises a minute. He took out more than forty patents for original inventions. He established the manufacturing town of Smithville, N. J., in 1871, and spent large sums in building model houses, halls and places of amusement for his workmen.

*All true whole men succeed ; for what is worth  
Success's name, unless it be the thought,  
The inward surety, to have carried out  
A noble purpose to a noble end,  
Although it be the gallous or the block ?  
'Tis only falsehood that doth ever need  
These outward shows of gain to bolster her.  
—A Glance Behind the Curtain ; LOWELL.*

3750 B. C.—Babylonia. Sargon was a great builder.

3700 B. C.—Naram-sin, his son, built a temple to the sun at Sippar. In 550 B. C. it was found by Nabonidus.

2287-2232 B. C.—Haamurabi built a great canal and many temples.

2286 B. C.—King Urakh built numerous temples.

2247 B. C.—Tower of Babel, Babylon, was built of bricks and mortar, as a means of escape in times of flood.

1120-1100 B. C.—Tiglath-Pileser was a great builder.

1100 B. C.—Architecture was cultivated by the Tyrians. The Phenicians traded with England for tin.

## JACQUES ANGE GABRIEL.

b. 1710.

d. 1782.

French engineer and architect. The genius which he displayed in his profession procured for him from Louis XV., in 1755, a commission to restore and enlarge the buildings of the Louvre. He held the post of first architect to the king.

*Sculptor, with ambition glowing,  
Sleep thyself to overflowing  
In the majesty and greatness,  
Strength, and beauty, and stateness  
Of th' antique ;  
But forget not living Nature,  
Heavenly in its form and feature,  
For the Greek.  
Beauty is renew'd for ever :—  
Let its love support endeavor,  
Though neglect enwrap thee now—  
Work ;—and men will find a laurel  
For thy brow.  
—To Impatient Genius : CHARLES MACKAY.*

1220 (about).—The four bronze horses by Lysippus, brought from Constantinople, were placed at St. Mark's, Venice.

1379-1446.—Brunelleschi, the founder of Renaissance architecture, lived.

1420-1436.—Brunelleschi built his epoch-making dome, 43 feet in diameter.

1588-1594.—The Rialto at Venice was erected and completed.

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MEMORANDA AND DIARY.

FRANK JULIAN SPRAGUE.

b. July 25, 1857.

d.

American electrical engineer and inventor. He entered the employ of Edison as an expert and applied himself to the development of electric motors. When the Sprague Electric Railway and Motor Company was organized, the industry of electric lighting enjoyed a remarkable stimulus. He has worked on the difficulties of elevated railway traction and has undertaken the building of large electric locomotives for experimental work. His electric express elevators promised a revolution in the elevator industry.

Ethereal powers ! You chase the shooting stars,  
Or yoke the vollied lightnings to your ears,  
Cling round the aerial bow with prisms bright,  
And, pleased, untwist the sevenfold threads of light;  
Eve's silken couch with gorgeous tints adorn,  
And fire the arrowy throne of rising Morn.  
—Or, plumed with flame, in gay battalions spring,  
To brighter regions borne on broader wing.

—Botanic Garden: DR. DARWIN.

18th Century (beginning).—India rubber was first brought to Europe from South America.

1838.—Nathaniel Hayward invented and patented the process of hardening rubber with sulphur; he assigned the patent to Charles Goodyear.

1847.—Gutta-percha was suggested as an insulator for electrical use by Faraday.

CALEB GOLDSMITH FORSHEY.

b. July 18, 1812.

d. July 25, 1881.

American engineer. In charge of the United States survey of the Mississippi delta in 1851-1853; chief engineer of the Galveston, Houston & Henderson Railway in 1853-1855; designed the bridge across Galveston West Bay. From 1855-1861 he established and conducted the Texas Military Institute, and entered the Confederate service as a lieutenant-colonel of engineers. He planned the defenses of the Texas frontier and the operations for the recapture of Galveston and the Texas coast. After the war he engaged in railroad construction in Texas, in the improvements at the mouth of the Mississippi, and in the United States engineer service on the Red River and Galveston Bay.

Over prairies of gold and green,  
Over rivers that roll between,—  
Plumbed mountains of richest sheen,  
The steam horse toils harder and harder ;  
Now scaring the wild herds and flocks,  
Now thundering over granite blocks,  
Now climbing the steep shelving rocks,  
Now up the Sierra Nevada.

Hail to the plains below !  
Hail to the peaks of snow !  
Hail to the hammer's stroke !  
Hail to the echoes woke !

—Rivet the Last Pacific Rail : G. W. BUNGAY.

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MEMORANDA AND DIARY.

## WILFRID DE FONVIELLE.

d. July 26, 1826.

d.

French aeronaut and scientist. He devoted much of his time to physics, invented several electrical instruments and discovered "rotary magnetic fields." He made numerous balloon ascents in order to carry his scientific experiments to great altitudes. He has written "L'Homme Fossil" (1865), "Les Merveilles du Monde Invisible" (1866) and "L'Astronomie Moderne" (1868).

—*Or rein the Planets in their swift careers,  
Gilding with borrow'd light their twinkling spheres;  
Alurn with comet-blaze the sapphire plain,  
The wan stars glimmering through its silver train;  
Gem the bright Zodiac, stud the glowing pole,  
Or give the Sun's phlogistic orb to roll.*

—*Botanic Garden*: DR. DARWIN.

2334 B. C.—Astronomical observations were begun at Babylon.

1267.—The Opus Major, by Roger Bacon, appeared, teaching the sphericity of the globe.

1473-1543.—Nicholas Copernicus lived, and in 1517 he discovered the true system of the universe, which completely overthrew the Ptolemaic theory.

1811.—Sir William Herschel published the nebular hypothesis.

1862-63.—William Huggins analyzed the light of the fixed stars and of the nebulae by the use of the spectrum.

## ISAAC BABBITT.

b. July 26, 1799.

d. May 26, 1862.

American inventor. In 1824 he made the first britannia ware manufactured in the United States; in 1839 he discovered the now well-known anti-friction metal that bears his name and is so extensively used in lining boxes for axles and gudgeons. He also engaged in the manufacture of soap.

*Some water and oil  
One day had a broil,  
As down in a glass they were dropping,  
And would not unite,  
But continued to fight,  
Without any prospect of stopping.*

*Some pearlash o'erheard—  
As quick as a word,  
He jumped in the midst of the clashing;  
When all three agreed,  
And united with speed,  
And soap was created for washing.*

—*Early Lesson in Chemistry.*

Soap was imperfectly known to the ancients. Pliny was the first who mentioned it, and declared it to be an invention of the Gauls.

1534.—The manufacture of soap was begun in London.

1804.—William Colgate arrived in New York and was apprenticed to a soap-maker.

1838.—Dyer and Hemming invented the ammonia process for making soda.



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TUESDAY.

1904.

MEMORANDA AND DIARY.

JAMES EDWARD OLIVER.

b. July 27, 1829.

d. March 27, 1895.

American mathematician. In 1849 was appointed assistant in the office of the "American Nautical Almanac." In 1871 he became assistant professor of mathematics at Cornell, and two years later was given full possession of the chair. He has published several text books on mathematics in conjunction with his associates at Cornell.

*Nature's mighty miracle is still over and around us ; and hence awe, wonder, and reverence remain to be the inheritance of humanity.*

—The Agency of Evil.

*As tennis is a game of no use in itself, but of great use in respect it maketh a quick eye, and a body ready to put itself into all postures ; so in the mathematics, that use which is collateral and inter-venient is no less worthy ; than that which is principal and intended.*

—BACON.

2800-1600 B. C.—Babylonians made tablets containing a table of squares from one to sixty, and other tables recording the magnitude of the illuminated portion of the moon's disk for every day, from new to full moon.

763, June 15, B. C.—Eclipse was recorded on tablets in Nineveh (Rawlinson).

585 B. C.—Thales predicted a solar eclipse.

773 A. D.—Hindu astronomical tables were translated into Arabic by royal order.

EBEN MORTON HORSFORD.

b. July 27, 1818.

d. January 1, 1893.

American chemist. The most important of his discoveries relate to the preparation of white bread and the restoration of the phosphates that are lost with the bran in milling, and the "acid phosphate," a medicinal agent. It was through his influence that the Lawrence Scientific School at Harvard was founded and endowed.

*Laboratories of a wider fold,  
I now behold,*

*Where are prepared the harvests yet unborn*

*Of wine, oil, corn.—  
In those mute rayless banquet-halls I see  
Myriads of coming feasts with all their revelry.*

*And what materials, mystic Alchemist !*

*Dost thou enlist*

*To fabricate this ever-varied feast,*

*For man, bird, beast ?*

*Whence the life, plenty, music, beauty, bloom ?*

*From silence, languor, death, insignificance and gloom !*

—HORACE SMITH.

1383 B. C.—Ceres arrived and taught the people the art of making bread.

401 B. C., Asia Minor.—A fermented beverage from barley (like beer) is made by the Armenians.

The cultivation of maize and cotton was attributed to the Toltecs of Mexico.

820.—Hop-gardens flourished.

1208.—Cider was first made in England, and called wine.

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WEDNESDAY.

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MEMORANDA AND DIARY.

GASPARD MONGE.

b. 1746.

d. July 28, 1818.

French geometer; discovered a new process of refining saltpetre; he substituted a moulding of sand for that of earth in the casting of cannon, invented a more expeditious method of perforation than the one in general use and instructed many in the art of making cannon. He composed his immortal work on *Statics*, took an active part in the foundation of the polytechnic school and wrote a treatise entitled "Stereotomy." He created that branch of mathematics called Descriptive Geometry, or the science of projection.

*By originality this world, from the start, has, age by age, been developing its resources and adding pearl after pearl to the diadem of its wisdom. Its movement has been sometimes like a spiral—slower, sometimes quicker; sometimes artistic, sometimes philosophic; but this or that way, ever onward, upward, from a lower to a higher plane.*

—Originality; REV. ELLAS NASON.

408 B. C.—Archytas first applied geometry to mechanics and framed mechanics on mathematical principles.

389 B. C. (about).—Menaechmus discovered conic sections.

98 A. D.—Menelaus of Alexandria invented spherical geometry.

1553.—Books of astronomy and geometry were destroyed, because it was alleged they were infected with magic.

KARL GUSTAV CARUS.

b. 1789.

d. July 28, 1869.

German physiologist and physician. Among his writings are an "Essay on the Nervous System" (1814); a "Manual of Zootomy" (1818); "Principles of Comparative Anatomy and Physiology" (1838), and a "System of Physiology" (1838-1840).

*Who, in the dark, the vital flame illum'd.  
And from th' impulsive engine caused to flow  
The ejaculated streams through many a pipe  
Arterial with meand'ring lapse, then bring  
Refluent their purple tribute to their fount:  
Who spun the sinew's branchy thread, and twin'd  
Life's tepid waves all o'er; or who with bones  
Compacted, and with nerves the fabric string;  
Their specious form, their fitness, which results  
From figure and arrangement, all declare  
The Artificer Divine.*

—BALLY.

9th Century.—Rhazes was the first to describe small-pox, and it was not until the fifteenth century that whooping-cough, scurvy, leprosy and syphilis were accurately described.

1718, March 18.—Lady Mary Montague had her infant son inoculated with virus of small-pox.

1853.—Schmidt, of Doport, made analyses of the gastric juices and experiments on the stomach of the Estonian peasant, Catharine Kutt.

1880.—From this time on grafting of skin, bone and nerves became common. More than 100 years before, John Hunter grafted teeth.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

OTHNIEL FOSTER NICHOLS.

b. July 29, 1845.

d.

American civil engineer. He was employed on the first elevated railway in New York City. In 1879 he was assistant engineer in the bridge shops of the New Jersey Steel and Iron Company; then became assistant to the President of the Peter Cooper glue factory in Brooklyn. In 1882 he was resident engineer of the Henderson Bridge over the Ohio, and in 1886 chief engineer of the Water Works Company of Westerly, Rhode Island, and then became assistant engineer of the Suburban Rapid Transit Company in New York City. In 1888 he was chief engineer of the Brooklyn Elevated Railroad Company, and later engineer-in-charge of the Williamsburg bridge over the East river.

*They build and man the argosies  
Of travel, war and trade,  
And in their potent engineering  
Their genius is displayed.*

—Ode to Labor; ANONYMOUS.

*For 'tis the sport to have the engineer\*  
Hoist with his own petar.* —SHAKESPEARE.

\* This is one of the earliest, if not the first, instance of the use of the word engineer.

1777.—The first large iron bridge was erected over the Severn in Shropshire, by Abraham Darby, of Coalbrookdale.

1795-98.—Thomas Telford's iron bridge was erected over the Severn.

RENNEQUIN SUALEM.

b. January 29, 1645.

d. July 29, 1708.

Belgian mechanician. He designed and built the Marly machines at the Marly waterworks. In 1682 the Marly machines were set in operation. They supplied water to the gardens at Versailles from the Seine River. They were crude pumping machines operated by the current of the river, but stupendous in size. They cost about \$1,500,000 and were the greatest works of the kind when built.

*The cloudy-browed, thick-soled, opaque Practicality, with no logic-utterance, in silence mainly, with here and there a low grunt or growl, has in him what transcends all logic-utterance: A Congruity with the Unuttered. The Speakable, which lies atop, as a superficial film, or outer skin, is his or is not his; but the Doodle, which reaches down to the World's center, you find him there!*

—Past and Present; CARLYLE.

2205 B. C.—Yu, a Chinaman, wrote several books on agriculture and irrigation.

1532-1550 B. C.—Well-sweeps are shown in sculpture made at that date.

1594.—Bevis Bulmer, with four pumps worked by horses, supplied a small district of London with water.

1675.—Samuel Moreland patented his plunger pump.

1705.—Thomas Newcomen and John Cawley created a pumping engine with a walking-beam and operated by the condensation of the steam and the pressure of the atmosphere. They also used the safety valve on their boiler.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

WILLIAM PAUL GERHARD.

JEAN ANTOINE CHAPTAL.

b. July 30, 1854.

d.

American sanitary engineer. In 1880 he assisted James B. Eads in the preparation of the plates of the "History of the St. Louis Bridge," and in 1881 became chief assistant to George E. Waring in Newport. For two years he was chief engineer for the Durham House-Drainage Company and since then has practiced sanitary engineering.

*I counted two and seventy stenchies,*

*All well defined and several stinks.*

*Ye Nymphs that reign o'er sewers and sinks,*

*The river Rhine, it is well known,*

*Doth wash your city of Cologne;*

*But tell me, Nymphs, what power divine*

*Shall henceforth wash the river Rhine.*

—Cologne: SAMUEL TAYLOR COLERIDGE.

Siphons, cocks and valves are of ancient origin. The Babylonians, Egyptians, Greeks and Romans had richer specimens than are now in use. In the fourth century the mouths of cocks and spouts were decorated and figured with lion heads and other artistic figures. The handles by which the plugs were turned were frequently of ornate figures. Rome, Pompeii, Constantinople, Smyrna and other ancient cities had their water-closets in public places and private houses of the wealthy, at the beginning of the Christian era.

285-247 B. C.—Conical metallic valves were used by Ctesibius in his clypsydre.

1745.—Trievald invented the float valve.

1767-1800.—The ball and socket joint of our water pipes was suggested to Watt by a lobster's tail and first used to convey water under the River Clyde.

b. June 4, 1756.

d. July 30, 1832.

French chemist, statesman and manufacturer; he made many improvements in the art of making wine. He improved the processes of producing mineral acids, alum, soda, white lead, etc.; discovered a new method for dyeing turkey red. He was successful in naturalizing the barilla of Alicante in the south of France.

*To help the young soul, add energy, inspire hope,  
and blow the coats into a useful flame; to redeem  
defeat by new thought, by firm action, that is not  
easy, that is the work of divine men.*

—Success: EMERSON.

*You can't keep a dead level long, if you burn  
everything down flat to make it. Why, bless your  
soul, if all the cities of the world were reduced to  
ashes, you'd have a new set of millionaires in a  
couple of years or so, out of the trade in potash.*

—The Poet at the Breakfast-Table: HOLMES.

1787.—Lavoisier included lime, soda and potash in his list of elements, and it was not until 1807-'08 that Davy decomposed them by the galvanic current.

1794.—Le Blanc, a Frenchman, discovered the process of making soda from common salt; the most valuable discovery in the whole range of chemical manufactures. He reaped no benefit from it, but spent his last days in an hospital, a wreck in fortune, health and hope.

1840.—Justus von Liebig showed the true process of plant and vegetable nourishment.



1904.

SATURDAY.

1904.

MEMORANDA AND DIARY.

JOHN ERICSSON.

b. July 31, 1803.

Swedish-American inventor, who revolutionized the arts of marine engineering and naval construction. He invented a pumping engine on a new principle; engines with surface condensers, no smoke-stack, draught supplied by blowers; mechanism for propelling boats; a hydrostatic weighing machine; sounding apparatus independent of the length of the leadline; a file-cutting machine; a line engraving machine and a self-acting gun-lock. In 1829 he produced the celebrated locomotive, the "Novelty." He is credited with inventing a revolving turret and placing it on a low iron-plated vessel, called the "Monitor," in 1861. (*See Timby, April 5.*) He first condensed steam and returned the water to the boiler, in the steamship "Victory," in 1828. In 1830 he introduced the "link motion," for reversing locomotives; in 1836 he patented the screw propeller. The caloric engine (1856) was his invention and he greatly improved steam fire-engines.

Ancient rocks.

*My hardy bones, are rent with nitrous fire,  
To rear thy marts, to bridge the leaping streams  
Or to usurp the ocean's older right,  
That selfish trade may dry-shod walk to power.  
The very ocean, grim, implacable,  
Thou loadest with the white-wing'd fleets of commerce.*  
—The Song of The Earth; GEORGE H. BOKER.

FREDERICK WOHLER.

b. July 31, 1809.

d. September, 1882.

German chemist. He has made several chemical discoveries, among which is a new method of obtaining pure nickel, and was the first to obtain aluminum in an isolated state. He obtained glucinum from glucina for the first time in 1827. Among his important works are his "Principles of Chemistry" (1840) and "Practical Exercise of Chemical Analysis" (1854).

*Of tendency through endless ages,  
Of star-dust and star-pilgrimages,  
Of rounded worlds, of space and time,  
Of the old flood's subsiding slime,  
Of chemic matter, force and form,  
Of poles and powers, cold, wet and warm.*  
—EMERSON.

*The chemist of love will this perishing mould,  
Were it made out of mire, transmute into gold.*  
—DIXON; HAFIZ.

1739.—Dr. Clayton explained the theory of gas-lights as the inflammable aeriform fluid, carburetted hydrogen.

1811.—Davy demonstrated that chlorine, discovered in 1774, and iodine, discovered in 1811, were elements.

1820.—Quinine, an alkaloid, was discovered by Pierre Joseph Pelletier and Joseph Bienaimé Caventou.

1890, December.—P. A. Emmanuel claimed to have discovered a process by which aluminum could be freed from kaolin at a cost of only \$2.50 per ton.

1904.

SUNDAY.

1904.

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MEMORANDA AND DIARY.

# AUGUST I.

PETER BONNETT WIGHT.

b. August 1, 1838.

d.

American architect. Between 1862 and 1868 he built the New York Academy of Design, the Yale School of Fine Arts and the Brooklyn Library. In 1880 he organized the Wight Fire-Proofing Company for the construction of fire-proof buildings. In 1874 he took out a patent for his method of rendering iron columns fire-proof. Other patents of his are for the construction of fire-proof ceilings in buildings where wooden joists are used for floor construction; for making iron floor-beams fire-proof when flat, hollow, tile floor arches are used; for devices to automatically close gates of swing-bridges, and for making terra-cotta coping for brick walls.

*Nymphs! your soft smiles uncultured man subdued,  
And charm'd the Savage from his native wood;  
You, while amazed his hurrying Hordes retire  
From the fell havoc of devouring Fire,  
Taught the first Art, with piny rods to raise,  
By Quick attrition, the domestic blaze,  
Fan with soft breath, with kindling leaves provide,  
And list the dread destroyer on his side.*

—BOTANIC GARDEN; DR. DARWIN.

1518.—Fire-engines were first made at Augsburg, Bavaria.  
1656.—Hautsch made and exhibited at Nuremberg one of the first really effective fire engines; it forced an inch column of water to a height of 80 feet.  
1700 (about).—Zachary Creyl made the first water bomb for extinguishing fires.

JEAN BAPTISTE PIERRE ANTOINE LAMARK.

b. August 1, 1744.

d. December, 1829.

French naturalist. The founder of Invertebrate Zoology. He recast the whole classification of Linnaeus, revived the masterly conception of Aristotle and divided the animal kingdom into Vertebrate and Invertebrate. In 1809 he published his "Philosophie Zoologique." He was a forerunner of Darwin, and held that by gradual changes the higher kinds of plants were developed from the lower forms.

*Say, what the various bones so wisely wrought?  
How was their frame to such perfection brought?  
What did their fingers for their uses fit?  
Their numbers fix, and joints adopted knit;  
And made them all in that just order stand,  
Which motion, strength and ornament demand?*  
—BLACKMORE.

460-360 B. C. Hippocrates, 384-323 B. C. Aristotle, 300 B. C. Herophilus and Erasistratus were the greatest Greek anatomists. Hippocrates published 72 works.

131-201 A. D.—Claudius Galens made important discoveries and investigations, and was the author of the first systematic treatise that has been preserved.

700-800.—The medical schools of Bagdad and Salerno flourished.

800.—The first apothecary's shop was established at Bagdad.

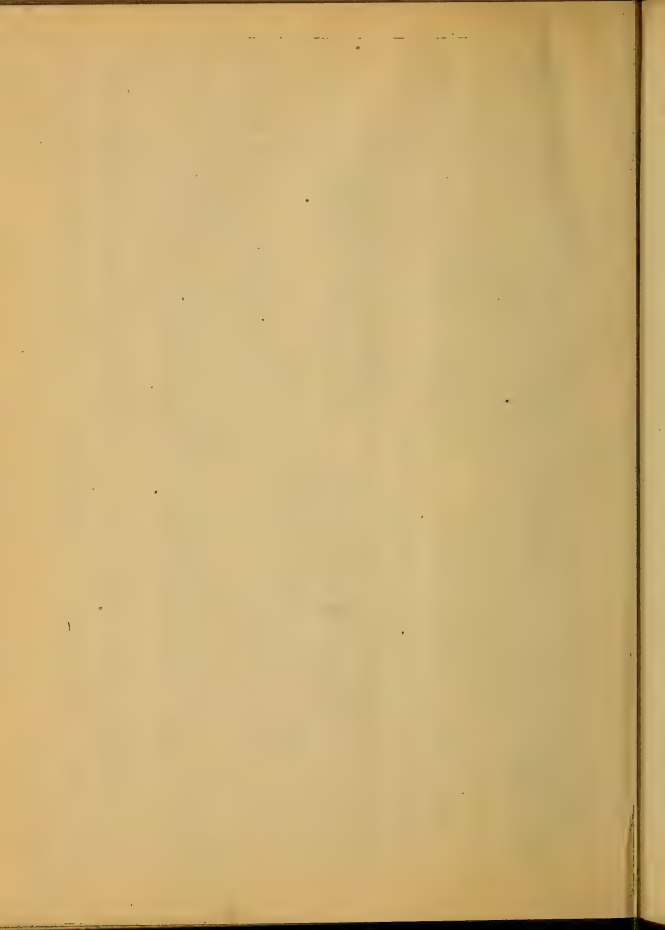
1315.—Mondini publicly dissected two human bodies at Bologna.

# NOTICE!

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The author and publisher beg to announce to the reader that this calendar will be issued for the year 1905 in new and various forms. They also announce that the calendar will be issued in special forms to meet the wants and wishes of manufacturers, transportation companies, supply men, contractors and builders, if they will make their wishes known. This was the original intention, but the work was completed so late in 1903 that it could not be issued in special form by or before the holiday trade; the other forms were therefore abandoned for 1904.

Suggestions and criticisms are respectfully invited by the author, John Cassan Wait, Attorney and Counselor at Law, 220 Broadway, The City of New York.



1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

ELISHA GRAY.

b. *August 2, 1835.*

American inventor. In October, 1867, he obtained his first patent for telegraphic apparatus, and since then has received nearly fifty more, most of which relate to the telephone. The remainder have reference to the telegraphic repeater, telegraphic switch, annunciator and type-printing telegraph. He invented a speaking telephone, for which he filed specifications February 14, 1876; in November, 1874, he filed a caveat, and in January, 1877, received a patent for a multiplex telegraph. In 1898, at the World's Fair at Chicago, he exhibited the teleautograph. He has published "Experimental Researches in Electro-Harmonic Telegraphy and Telephony" (New York, 1878).

*Let no mean jealousies pervert the mind,  
A blemish in another's fame to find;  
Be grateful for the gifts that you possess,  
Nor deem a rival's merits makes yours less.*

—COWPER.

20-11 B. C.—Vitruvius in his *Architectura* described the undulatory theory of sound.

1666-71.—Robert Hooke conveyed sounds to a distance by a distended wire.

1820.—Sir Charles Wheatstone conveyed the sounds of a musical box from a cellar to upper rooms by a deal rod; he called it the enchanted lyre.

STEPHEN MONGOLFIER.

b. *January 7, 1745.*

d. *August 2, 1799.*

He and his brother Joseph are the French inventors of the balloon (1783); they were successful paper manufacturers near Lyons. The first public exhibition was made at Annonay, near Lyons, June 5, 1783; and on October 15, 1783, the first human being ascended in a balloon. They made various mechanical inventions, among them the well-known "hydraulic ram" in which the impulse of a large mass of water descending from a small height is made available to raise a small mass of water to a great height.

*Fair mounts the light balloon, by Zephyr driven,  
Parts the thin clouds, and sails along the heaven;  
Higher and yet higher the expanding bubble flies,  
Lights with quick flash, and bursts amid the skies.  
Headlong he rushes through the affrighted Air  
With limbs distorted, and dishevel'd hair,  
Whirls round and round, the flying crowd alarms,  
And Death receives him in his sable arms!*

—Botanic Garden; DR. DARWIN.

1644.—Pascal demonstrated that the vacant space in barometer tube was a vacuum.

1650.—Otto von Guericke succeeded in exhausting a copper sphere, producing a vacuum; in 1654 he invented the air-pump.

1660 (about).—Boyle performed his important experiments with the air pump.



1904.

TUESDAY.

1904.

MEMORANDA AND DIARY.

JOHN WALKER.

b. August 3, 1847.

d.

Anglo-American engineer. He was connected with William Sellers & Co. when he conceived the idea of a gear scale for use in setting out graphically the form of teeth for gear wheels. His scale is still recognized as the most simple and expeditious, as well as scientific, method for laying out the teeth of gear wheels. Patents granted him from 1880-1882 were for shaft couplings, molding machines, gear molding machines, traveling cranes and other mechanical devices. On September 20, 1882, was founded the Walker Manufacturing Company, which has grown to be one of the greatest manufacturing concerns in the United States. His invention of the differential cable-drum, used in cable railways and for haulage in mines, added to the business.

*The need that pressed sorest  
Was to vanquish the seasons, the ocean, the forest,  
To bridle and harness the rivers, the steam,  
Making that whirr her mill-wheels, this tug in her team,  
To vassalize old tyrant Winter, and make  
Him delve swiftly for her on river and lake :—  
When this New World was parted, she strove not to shrink  
Her lot in the beiradom, the tough silent Work,  
The hero-share ever, from Heracles down  
To Odin, the Earth's iron sceptre and crown.  
—A Fable for Critics: JAMES RUSSELL LOWELL.*

ELISHA GRAVES OTIS.

b. August 3, 1811.

d. April 8, 1861.

American inventor; inventor of elevators and hoists. He put into practical operation a hoisting-machine that embodied novel features to automatically prevent loss of life in case of the breaking of the lifting-cable.

*What have these arts done for the character, for  
the worth of mankind? Are men better? 'Tis  
sometimes questioned whether morals have not de-  
clined as the arts have ascended. Here are great  
arts and little men. . . . Look up the inventors.  
Each has his own knack; his genius is in veins and  
spots. But the great, equal, symmetrical brain,  
fed from a great heart, you shall not find. Every  
one has more to hide than he has to show, or is  
lamed by his excellence.*

1780 (about).—Oliver Evans introduced the use of chain of pots into flour mills to elevate grain and flour.

1846.—Sir William Armstrong's hydraulic crane was patented.

1866.—Elevators operated by steam introduced in St. James hotel.

1870.—Steam derricks first employed by James T. Smith in building New York Post Office foundations.

1872.—Chain ladder for hod hoisting used in New York.

1878.—Post and McCord used steam derricks for hoisting iron work.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

RAOUL PICTET.

b. *August 4, 1846.*

*d.*

French physicist. He made ice machines and invented a process for freezing large areas of ice for skating. He liquefied oxygen December 29, 1877. The importance and value of his early experiments cannot be overestimated. His double cycle, with continuous liquefaction of the gases in the two refrigerating cycles, has been an instrument of the greatest success in the hands of subsequent workers. The keynote of his labors was an advanced refrigerating apparatus. He employed anhydrous sulphurous acid.

*The body  
Much toil demands ; the lean elastic less.*

*While winter chills the blood and binds the veins,  
No labors are too hard ; by those you 'scape  
The slow diseases of the torpid year,  
Endless to name.*

—*Art of Preserving Health* : ARMSTRONG.

1650-1660.—Otto von Guericke made extended experiments of phenomena *in vacuo*.

1787.—Quicksilver was frozen without the aid of snow or ice.

1810.—Sir John Leslie froze water in an air-pump by placing a vessel of sulphuric acid under it.

1802.—A. C. Kirk invented a refrigerating machine.

1884.—Sigmund von Wroblewski predicted that liquid air would be the refrigerant of the future.

PETER WOULFE.

b.

1727.

*d.*

1805.

English chemist ; a firm believer in alchemy. He first discovered native tin at Cornwall in 1766. He designed an apparatus for experiments with gases, which invention formed "almost an era in chemical discovery," no convenient method having been known previously for obtaining concentrated solutions of soluble gases, or for purifying insoluble gases from soluble impurities. He applied his apparatus to the production of hydrochloric ether by passing gaseous hydrochloric acid into alcohol. He was elected Fellow of the Royal Society on February 11, 1767, and contributed several papers to the "Philosophical Transactions."

*Here's the rich Peru,  
And there within, sir, are the golden mines,  
Great Solomon's Ophir ! He was sailing to 't  
Three years, but we have reached it in ten months,  
This is the day wherein to all my friends  
I will pronounce the happy word, Be Rich.*

*This night I'll change*

*All that is metal in thy house to gold ;*

*And early in the morning will I send*

*To all the plumbers and the penturers,*

*And buy their tin and lead up ; and to Lothberry*

*For all the copper.*

*Yes, and I'll purchase Devonshire and Cornwall,*

*And make them perfect Indies.*

—JONSON'S ALCHEMIST.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

THOMAS HARRIS BARLOW.

b. August 5, 1789.

d.

1865.

American inventor; finished his first planetarium in 1851. This is now in use at West Point, the Washington Observatory and other institutions.

*The sun is set, and all the air is still; the hill;  
The moon's pale beams are slanting o'er the hill;  
Venus, in glory, shines among the stars,  
And brightly glows the ruddy face of Mars.  
Old Jupiter, with pure, effulgent light,  
In majestic serenity, adorns the night;  
While Saturn, meekly sheds a milder ray,  
But proudly moves along his starry way.  
Each in its orbit through unmeasured space  
Sweeps round the central sun in tireless race.*

—Soliloquy to The Stars.

*If you have great talents, industry will improve them;  
if moderate abilities, industry will supply their deficiencies.  
Nothing is denied to well-directed labor; nothing is ever to be attained without it.*

—SIR J. REYNOLDS.

1553.—Oronce Fine began his planetary clock.

1776.—Lagrange proved the stability of the planetary orbits.  
1780.—Antoine Laurent de Jussieu founded the national system of plants.

1857.—The photoheliograph was erected at Kew Observatory. It registered the position and appearance of the sun's spots by means of a clockwork mechanism.

1875.—Urban J. J. Leverrier analyzed the orbits of the planets.

JAMES DONDI.

Died about 1369.

About 1369 he constructed for the City of Padua a clock which was long considered the wonder of the age. This was the first clock on record having its dial-plate divided into twenty-four hours; but it has been disputed whether or not Dondi (afterward called Horologus) was the original inventor. Besides indicating the hours, this clock represented the motions of the sun, moon and planets, and pointed out the different festivals of the year.

*'Tis with our judgment as our watches, none  
Go just alike, yet each believes his own.*

—POPE

*But as when an authentic watch is shown,  
Each man winds up and rectifies his own.*

—SUCKLING.

1477.—Bavaria. Watches were first made at Nuremberg.

1500.—Clocks were first used in astronomy.

1510.—Philip Hele invented pocket watches.

1568.—Clocks were first made in England.

1720.—Clocks were introduced into United States, and substituted for hour-glasses.

1735.—John Harrison produced his first time-piece in London; in 1739 his second and in 1749 his third.

1793.—First clock was manufactured in United States at Plymouth, Conn.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

WILLIAM HYDE WOLLASTON.

b. August 6, 1766.

d. December 22, 1828.

English physician and experimental philosopher. A want of patronage as a physician induced him to give up the medical profession and to devote himself to scientific pursuits. Among his discoveries are the two metals, palladium and rhodium (1803), and the method of rendering platina malleable. Among his inventions are a sliding scale of chemical equivalents; the reflecting goniometer; and the camera lucida. In 1803 he invented the "periscopic" spectacle. In 1801 he established that "galvanic" and "frictional" electricity are of the same nature. He suggested the use of two plano-convex lenses in lieu of the single double convex to overcome the spherical aberration. He introduced the diaphragm to limit the field of vision between the lenses, the periscopic microscope.

*No greater men are now than ever were. A singular equality may be observed between the great men of the first and of the last ages. The arts and inventions of each period are only its costume, and do not invigorate men. . . . Galileo with an opera-glass discovered a more splendid series of celestial phenomena than any once since. Columbus found the new world in an undecked boat. It is curious to see the periodical disuse and perishing of means and machinery. The great genius returns to essential man.*

—Self-Reliance; EMERSON.

JOHN HEATHCOAT.

b. August 7, 1783.

d. January 18, 1861.

English inventor. He invented improvements so important that he may justly be considered the inventor of the lace-frame and the father of the bobbin-net manufacture.

*Threads in single, threads in double;  
How they mingle! what a trouble,  
Every color! what profusion!  
Every motion—what confusion!  
While the web and woof are mingling,  
Signal bells above are ringing,  
Telling how each figure ranges,  
Telling when the color changes,  
As the weaver makes his shuttle,  
Father, thither, scud and scuttle.*

—The Mystic Weaver; REV. DR. HARBAUGH.

*'Tis thus at the roaring loom of time I ply,  
And weave for God the garment thou viewest him by.*

1820.—Delicate lace was manufactured in Flanders.

1711–1771.—Hobfield lived and invented several machines for lace making, a threshing machine and one for chopping straw.

1793–1869.—John Nesmith lived and invented a machine for making shawl fringe.

1743.—The first Paisley handkerchiefs were made.

1811.—John Burn patented a machine for making bobbin lace.



1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

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# AUGUST 7.

## THOMAS NEWCOMEN.

- b. *February* 28, 1663. *d. August* 7, 1729.
- English inventor of the steam and atmospheric engine. Savery is also thought to be the inventor, his patent bearing the date June 25, 1698. There is no doubt but that Savery and Newcomen were in partnership, the patent covering Newcomen's improvements. He was also a blacksmith and ironmonger.

*There's a big resounding whistle on the engine when it toils—  
None thinks about the water as it bubbles and it boils—  
There is buzz and there is bustle and the people love to gaze  
As the prodigy goes onward in its unresisted ways.  
We quite forget, while watching all the beauty of the scheme,  
That somewhere out of sight is pent the mighty force of steam.  
But, despite this lack of splendor, 'tis agreed by men of wit  
That if the steam were wanting the machinery would quit.*

—A Silent Essential: THE WASHINGTON STAR.

1827.—James B. Nielson of Glasgow, Scotland, patented his hot-air blast.

1839.—Josiah M. Heath patented his process of adding 1% of carburet of manganese to the melting pot in the manufacture of blistered steel.

1856.—First experiments in producing steel by Bessemer process were tried at Phillipsburg, N. J.

1891.—Experiments made in Pittsburg relating to properties of nickel-steel and manganese-bronze resulted in discovery of a new metal with superior characteristics for all uses. It was of high tensile strength, impervious to acids, indestructible by corrosion and capable of being wrought while either hot or cold.

## JONATHAN HAIGHT GEDNEY.

- b. *February* 25, 1798. *d. August* 7, 1886.

American inventor of wooden cogs, used in the cotton-gin, and of a horse plow for digging potatoes.

*I am the plow, master of Life!  
Where my sharp colter leads ceases sterility,  
And by my largesses, gladdened and satisfied,  
Follow the peoples!*

*I, in the glimmering dawn, furrowing circlewise,  
Leaving wide gaps where Death swung his black gates anon,  
Traced the foundations where rose the proud battlements,  
Bastions and walls round the City of Life!*

—The Master of Life: LONDON SPECTATOR.

*No dread of toil have we or ours;  
We know our worth, our weight, our powers,  
The more we work, the more we win;  
Success to Trade! Success to Spade!  
And to the corn that's coming in;  
And joy to him, who o'er his task  
Remembers toil is nature's plan;  
Who working thinks, and never sinks  
Has independence as a man.*

—GERALD MASSEY.

Osiris is credited with inventing the plow; Occator, the harrow; Sarritor, the rake; Saturn, the scythe; Ceres, the sickle; and Triptolemus, the flail.

2832 B. C.—Shinnung, the Divine Husbandman, lived.

2650 B. C.—The Emperor Shun Nung, the successor of Fohi, invented the plow, and introduced agriculture and medical science.

1904.

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MEMORANDA AND DIARY.

# AUGUST 8.

BENJAMIN SILLIMAN.

b. August 8, 1779.

d. November 24, 1864.

Yale, 1796.

American scientist and lawyer. He examined and analyzed the meteor that fell near Weston, Conn., in 1807, and wrote the best account of the fall of a meteor in America. In 1811 he experimented with the oxy-hydric or compound blow-pipe invented by Robert Hare and succeeded in melting the most refractory minerals, including the alkaline earths, which had never been reduced before. He obtained the metals sodium and potassium. In 1823, while observing the action of a powerful voltaic battery, he noticed that the charcoal points of the negative pole increased in size, and that there was a corresponding cavity on the point of the positive pole. He declared that the charcoal had been fused, which was long disputed in Europe but is now universally accepted. In 1818 he founded the "American Journal of Science." He was called the "Nestor of American Science."

*We stand here at the end of mighty years,  
And a great wonder rushes on the heart.  
While cities rose and blossomed into dust,  
While shadowy lines of Kings were blown to air,—  
What was the Purpose brooding on the world  
Through the large leisure of the centuries?  
And what the end—failure or victory?*

CHARLES BULFINCH.

b. August 8, 1763.

d. April 15, 1844.

American architect. In 1793 he built the first theatre in Boston. He drew the plans for the State House, Faneuil Hall, and the City Hall in Boston, for the Capitol in Washington, and designed forty churches and other buildings in New England cities. He was architect of the National Capitol from 1817 until it was completed in 1830.

*In the elder days of Art,  
Builders wrought with greatest care  
Each minute and unseen part;  
For the gods see everywhere.*

*Let us do our work as well,  
Both the unseen and the seen;  
Make the house, where gods may dwell,  
Beautiful, entire, and clean.*

*Else our lives are incomplete,  
Standing in these walls of Time,  
Broken stairways, where the feet  
Stumble as they seek to climb.*

—The Builders: LONGFELLOW.

*Lo, man has laid his sceptre on the stars,  
And sent his spell upon the continents, stones,  
Silent as God, publish their mystery.  
Man calls the lightnings from their secret place  
To crumple up the spaces of the world,  
And snatch the jewels from the flying hours.*

—A Century Poem: EDWIN MARKHAM.

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MEMORANDA AND DIARY.

## AUGUST 9.

JOSEPH LOCKE.

*b. August 9, 1805. d. September 18, 1860.*  
Scottish civil engineer. He aided George Stephenson in the construction of the Manchester & Liverpool Railway, and constructed the following lines: The Grand Junction, 1835-'37; the London & Southampton, 1836-'40; the Lancaster & Preston, 1837-'40; the Greenock, Paisley & Glasgow, 1837-'41; the Sheffield & Manchester, 1838-'40; the Paris & Rouen line, 1841-'43, and the Rouen to Havre, 1843. He was the designer of the Crewe engine, in which the several parts were made with mathematical accuracy and were capable of fitting indifferently any engine. He formed, with Robert Stephenson and Brunel, the triumvirate of the engineering world.

*How yon enormous mole projecting breaks  
The mid-sea, furious waves! their roar amidst,  
Out-speaks the Deity, and says, "O main!  
Thus far, not farther! new restraints obey!"  
Earth's disembow'd! measur'd are the skies!  
Stars are detected in their deep recess!  
Creation widens! vanquish'd nature yields!  
Her secrets are extorted! Art prevails!  
What monuments of genius, spirit, pow'r!*

*Whose glories render heav'n superfluous! say,  
Whose footsteps these?—Immortals have been here.  
Could less than souls immortal this have done?  
Earth's cover'd o'er with proofs of souls immortal;  
And proofs of immortality forgot.*

—Night Thoughts: YOUNG.

THOMAS TELFORD.

*b. August 9, 1757. d. September 2, 1834.*  
Scottish engineer; built the Dublin Road from London to Holyhead, including the Menai and Conway Bridges. The former bridge is built on the suspension principle. The Caledonian Canal was commenced by him in 1802, and was first opened October 23, 1822. He was engineer of the Ellesmere Canal, projected to connect the Mersey, the Dee and the Severn. He invented the improved macadamized roads, such as are in Central Park, New York, which caused the poet Southey to call him the "Colossus of Rhodes." He was called "Laughing Tam" in his youth, on account of his cheerful disposition.

*Nor pass the tentle curious lad,  
Who o'er the ingle hangs his head,  
And begs of neighbors books to read;  
For hence arise,  
Thy country's sons, who far are spread,  
Baith bold and wise.*  
—TELFORD.

*Millions march, but make no progress. They  
plow, sow, reap, hew, forge, and build; it is the  
same dull story—furrow in the same old furrow;  
song on the same old key note; driving a tread-  
mill; grinding corn, like Samson, blinded.*

1794.—Turnpike road, between Lancaster and Philadelphia, 62 miles built.

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MEMORANDA AND DIARY.

## AUGUST 10.

THOMAS JEFFERSON MAYALL.

*b. August 10, 1826.*

American inventor. He was employed in a paper-mill and made improvements in the machinery. He devised the first rubber belt that was used in this country and the first cylinder printing-machine, from which has grown the present industry of wall-paper and calico printing. His other inventions include a method of producing satin-faced paper, a method of vulcanizing rubber (1841), an automatic battery, a revolving cannon, bomb shells, a coffee-hulling machine and a self-acting drawbridge for railroads.

*They whirl and dash, through the nights and days,  
The magical looms of thought;  
And in and out, through a thousand ways,  
The flashing threads are brought.  
Their swift purveyors part and meet,  
On rail and ship, on mart and street,  
With tireless brain, with hurrying feet,  
As the endless web is wrought.*

—Song of the Press: THE ARGOSY.

1799, August 10.—Cyrus Buckland was born. In 1842 he perfected his stocking-frame, by which finished gun-stocks were made directly by machines from the rough stick of wood.

1849, August 10.—Charles E. Tripler was born. In 1891 he succeeded in liquifying air, after which he applied it to compressed air motors.

JULIUS WEISBACH.

*b. August 10, 1806.*

German mathematician and hydraulic engineer. His chief accomplishments were in hydraulics and mechanics. He introduced a new system of mining surveying and advanced axonometry. By his introduction of the "coefficient of resistance" into mathematical calculations, and his discovery of the "incomplete contraction" of water according to the nature of the orifice whence it flows, he greatly simplified and advanced the science of hydraulics. The most important of his numerous works are "Lehrbuch der Ingenieurund Maschinenmechanik" (1845-'54) and "Der Ingenieur" (1848).

*Laborious still, he taught the early mind,  
And urg'd to manners meek and thoughts refin'd;  
Truth he impress'd, and every virtue prais'd;  
While infant eyes in wondering circles gazed;  
The worth of time would day by day unfold,  
And tell them every hour was made of gold.*

—TIMOTHY DWIGHT.

*He widened knowledge and escaped the praise;  
He wisely taught, because more wise to learn;  
He toiled for Science, not to draw men's gaze,  
But for her love of self denial stern.*

*That such a man could spring from our decays  
Fans the soul's nobler faith until it burn.*

—JEFFRIES WYMAN.



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MEMORANDA AND DIARY.

# AUGUST 11.

MACEDONIO MELLONI.

b. April 11, 1801.

d. August 11, 1854.

Italian scientist. He wrote several scientific works, one of which "La Termocrasi," explained his theory concerning the radiation of heat and the coloration of light. He originated valuable discoveries on these subjects.

*Here the Proteus works his spells; the self-same essence takes a million shapes and hues, and finally dissolves into its primitive and formless form. The sun comes to us as heat, and quits us as heat, and between its entrance and departure the multiform powers of our globe appear. They are all special forms of solar power—the moulds into which his strength is temporarily poured in passing from its source through infinitude.*

—*The Influences of the Sun* : JOHN TYNDALL.

1670.—Christian Huygens introduced the theory of oscillation.

1714.—Newton explained the correct theory of fluids and the oscillation of waves.

1784.—The Atwood machine was designed and described.

1797.—Count Rumford boiled water by friction in London.

1799.—Sir Humphry Davy melted ice by friction.

1843.—Joule established the conservation of energy and the mechanical equivalent of the heat unit.

1852.—Sir William Thomson discovered the dissipation of energy.

EPHRAIM BALL.

b. August 12, 1812.

d. January 1, 1872.

American inventor; first invention was a turn-top stove, in 1854. The "Ohio Mower" was invented by him, and afterwards he devised the "World Mower and Reaper," and in 1858 the "Buckeye Machine" was brought out. From 1858 he devoted his attention principally to the manufacture of his "New American Harvester."

*My days are never weary, yet I toil  
Like a strong plough that turns a stony soil;  
A harvest it shall bear!*

*My soul is precious land I hold from God—  
Early and late I furrow every sod.*

*And drop the rich seed there.  
And still I feel no weariness nor pain  
Steal over me. My labour is not vain.*

*Autumn will show her sheaves of golden grain!  
For, reared with earnest care,  
—Industry : PHILIP GILBERT HAMERTON.*

1799.—A mowing-machine was invented by Boyce.

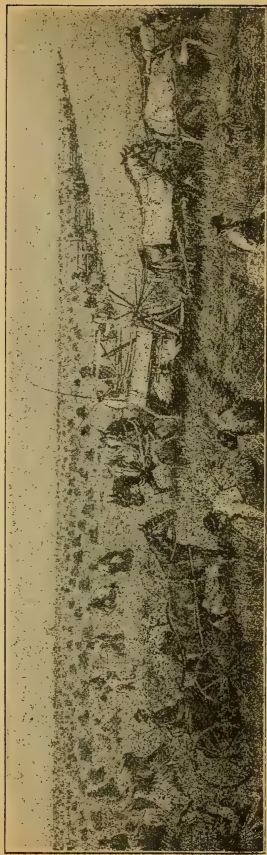
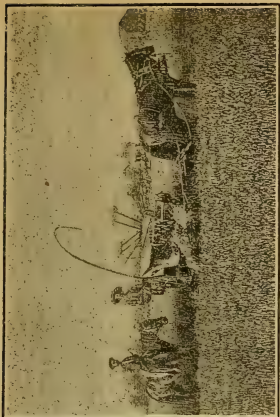
1826.—Patrick Bell invented a reaping machine.

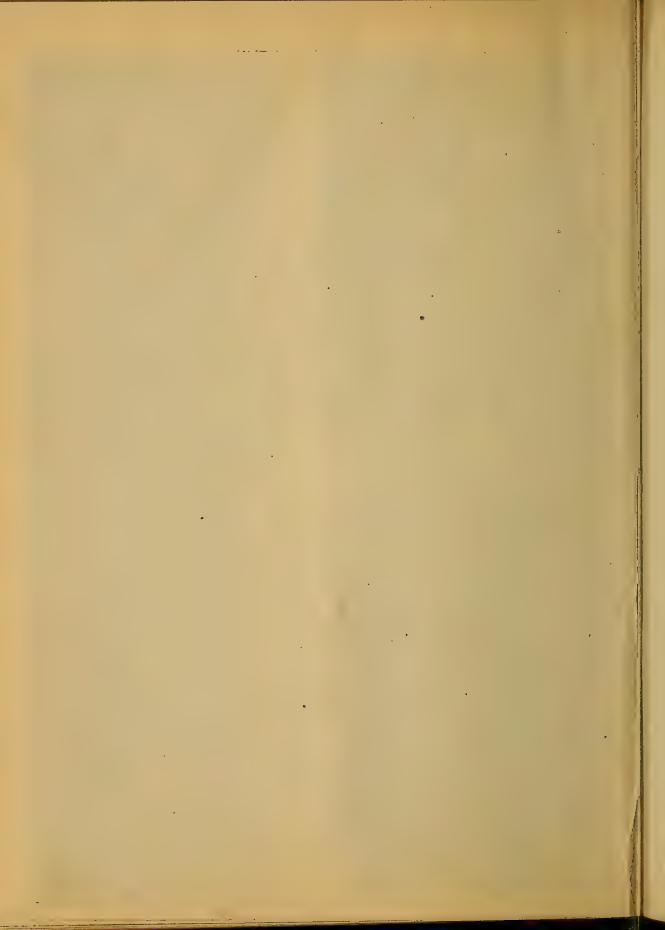
1833.—Obed Hussey built his first successful harvesting machine.

1852.—Hoffmeier produced a rake which also operated as a reel.

1866.—Sam Johnson produced the first self-raking reaper.

1898, January 15.—Rev. Patrick Bell received a testimonial and £1,000 for inventing a reaping-machine in 1826.





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MEMORANDA AND DIARY.

## AUGUST 12.

THOMAS ANDREW KNIGHT.

b. August 12, 1759.

d. May 11, 1838.

English vegetable physiologist and horticulturist. He succeeded Sir Joseph Banks as President of the British Horticultural Society. He produced new and valuable varieties of fruits from seeds, and made experiments in vegetable fecundation and in the germination of seeds. He published "A Treatise on the Culture of the Apple and Pear."

*Whatever fruits in different climes are found  
That proudly rise or humbly court the ground;  
Whatever blooms in torrid tracts appear,  
Whose bright succession decks the varied year;  
Whate'er sweets salute the northern sky  
With vernal tines that blossom but to die—  
These, here disporting, own a kindred soil,  
Nor ask luxuriance from the planter's toil.*

1508.—Ornamental gardening was introduced, chiefly from the Netherlands.

1520.—Lettuce was introduced into England from Flanders.

1533.—Botanical gardens were established at Padua.

1567.—Physic gardens were first planted in London by John Gerard, a surgeon.

1768.—The tea-plant was brought to England.

1838.—The magnificent water-lily, called Victoria Regia, was introduced into England from Guiana by Sir Robert Schomburgk.

WILLIAM CHISHOLM.

b. August 12, 1825.

d.

Scotch inventor. He devised new methods and machinery for manufacturing steel shovels, spades and scoops, and established a new factory for that industry in 1879. In 1882 he began to make steam engines of a new model, adapted for hoisting and pumping; also transmitters for carrying coal and ore between vessels and railroad cars.

*Tools and the man I sing. —T. CARLYLE.*

*Justice exacts that those by whom we are most  
benefitted should be most admitted. —DR. JOHNSON.*

*Then plow shall come, and forge, and mill,  
And Time shall bend the backward will,  
While trades of men impatient wait,  
And helplessly at sloth-bound gate*

*Sit out the nights that sadden;  
Yet, finally, by sea and land—  
Though ignorance Gibraltar'd stand—  
The long-shut, rusty gates shall swing,  
And Thrift come in with anvil ring,  
And bring the dawns that gladden.*

—DAUNTS THAT GLADDEN: STEVENS BUCK.

1796.—Chain-pump introduced from China into United States by Van Braam.

1862.—International Exhibition, where chain-pumps were exhibited.

.....Besson proposed the chain of pots to raise mortar to higher stories of a building in process of erection.

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MEMORANDA AND DIARY.

ANTOINE L. LAVOISIER.

b. *August 13, 1743.*

*d. May 8, 1794.*

French chemist who established the basis of modern chemistry and gave it a methodical nomenclature. He was the first to establish the exact proportion of the elements composing water. It is to chemistry as Lavoisier made it that we owe the bleaching of hemp and linen, the refining of metals, lighting by gas, sugar from beets, the improved manufacture of steel and new modes of dyeing. The composition of the air became known, and its relationship to combustion and to both the life of plants and of animals was clearly defined. The masterly mind of Lavoisier marshalled the elements into order. A system of nomenclature was devised. It was seen that the facts collected pertained to a distinct science. Since then chemistry has been a separate branch of natural philosophy.

*O Lavoisier, master great,  
We mourn your awful fate,  
But never tire of singing to your praise.  
You laid foundations true,  
And we must trace to you,  
The chemistry of our enlightened days.*

—Anonymous.

*Upon the scroll of honor, year by year,  
In shining letters written, we behold  
The names of those whose glory grows not old,  
Whose memories remain forever dear.*

—FRANK D. SHEEMAN.

MARQUIS LUIGI CAGNOLA.

b. 1762.

*d. August 14, 1833.*

Italian architect. His principal works are the triumphal arch of the Porta del Ticino at Milan; the Campanile at Ugnano (1839); the churches at Valvallo and Ghisalba; and the marble Porta del Sempione, Milan, commenced in 1807 and finished under the name of "Arch of Peace" about 1835.

*Of rain at Reggio, rain at Parma;  
At Lodi, rain, Piacenza, rain.  
And stern and sad (so rare the smiles  
Of sunlight) took't the Lombard piles;  
Porch-pillars on the lion resting,  
And sombre, old, colonnaded aisles.  
O Milan, O! the chanting choirs;  
The giant windows' blazon'd fires;  
The height, the space, the gloom, the glory!  
A mound of marble, a hundred spires!*

—COLERIDGE.

1067.—The cathedral at Pisa was begun.

11th Century.—The cathedral of Aquileia was founded.

1084.—The cathedral of San Matteo was dedicated.

1377-1444.—Philip Brunelleschi lived. He erected the churches of the Holy Ghost and of St. Lorenzo, and the Pitti Palace at Florence, and the monastery of Fiesole. He invented a new system of constructing vaults.

1404.—February 18, 1438, Aristotle Alberti lived. He removed the entire tower of St. Mary, with all its bells, to a distance of thirty paces, and set upright another which leaned five feet.

1481.—The Palazzo Vendramin-Calergi at Venice was built.

1482.—The cathedral of Lucca was commenced.



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FREDERICK GRINNELL.

b. August 14, 1836.

d.

Rensselaer Polytechnic, 1854.

American mechanical engineer and inventor. He was superintendent of the Corliss steam-engine works. In 1869 he became president, manager and mechanical engineer of the Providence Steam and Gas Pipe Company. He introduced and has done much to perfect the automatic fire extinguisher and alarm.

*No; the two kinds of people on earth I mean  
Are the people who lift and the people who lean.  
Wherever you go you will find the earth's masses  
Are always divided in just these two classes.  
And, oddity enough, you will find, too, I ween,  
There is only one lifter to twenty who lean.  
In which class are you? Are you easing the load  
Of overtaxed lifters, who toil down the road?  
Or are you a leaner, who lets others share  
Your portion of labor, and worry, and care?*

—Which Kind Are You: ELLA WHEELER WILCOX.

*Blessings on science, and her handmaid Steam,  
They make Utopia only half a dream;  
And show the fervent of capacious souls,  
Who watch the ball of Progress as it rolls,  
That all as yet completed, or begun,  
Is but the dawning that precedes the sun.*

—Railways: CHARLES MACKAY.

1867.—Insurance of houses and goods against fire began at London.

THOMAS GERMAIN.

b. 1673.

d. August 14, 1748.

French sculptor and goldsmith. Made great improvements in designing and working gold and silver.

*Industry, from which all arts and science is properly derived, is one of the first and most indispensable conditions. It not only enables genius to make itself master of the mechanical resources of the art, but gradually excites judgment and reflection to take part in all that it produces.*

—FORKEL.

*He hath filled him with the spirit of God in all manner of workmanship; and to devise curious works, to work in gold, and in silver, and in brass, and in the cutting of stones, to set them, and in carving of wood, to make any manner of cunning work.*

—Exodus, Chapter 35.

Gold leaf was used for gilding by the Egyptians and Greeks many centuries before the Christian Era.

1150.—The modern method of gold-beating was invented in Nuremberg. Here glass-cutters flourish.

1413.—Fulminating gold was discovered by Valentine, a monk, at Erfurt.

1788.—Fulminating silver was discovered by Bertheollet.

1805.—Brugnattelli, an Italian chemist, gilded a silver medal by connecting it with the negative pole of a voltaic battery, when immersed in a solution of ammoniuret of gold.

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MEMORANDA AND DIARY.

JOHN NEPOMUK MAELZL.

b. August 15, 1772.

d. July 21, 1838.

German inventor ; he produced an orchestron instrument ; 1804, made known an improved musical instrument, which he called the "parharmonicon" and which was worked by weights that acted on cylinders ; in 1808 he invented an improved ear-trumpet and a musical chronometer ; in 1816 he became established in Paris as manufacturer of his newly-invented "metronome," an instrument of enduring value.

*But what is the secret of originality ? Well, first, there must be aspiration. This comes from inspiration, which is from above ; as when ten thousand tongues and instruments were pealing forth the grandest strains of his Creation, Haydn rose and, pointing upward, said ; " It comes from there ! "*

—Originality : REV. ELIAS NASON.

*The string that jars*

*When rudely touch'd, ungrateful to the sense,  
With pleasure feels the master's flying fingers,  
Swells into harmony, and charms the hearers.*

—Rowe.

1580 B. C.—The cymbal is the oldest musical instrument of which there is a certain record. It was made of brass, like a kettle drum.

800 A. D.—The clarion originated with the Moors in Spain. 1766.—The first piano was made in England.

1817-1845.—Obed M. Coleman lived and invented the "Automaton Lady Minstrel or Singing Bird," and made the Aeolian attachment to the piano-forte.

MERRITT GALLY.

b. August 15, 1838.

d.

American inventor ; constructed a press for artistic printing. This was known as the "Universal" printing press, and its success was such that he established a manufactory for building the presses in 1869. In the progress of this enterprise he invented and constructed a large number of tools and mechanical appliances designed to render the presses perfectly interchangeable in every part. He has invented a multiplex telegraph, and in 1873 patented a device for converting the variable velocity of machinery into constant velocity. He produced the "Orchestrone."

*God said—"Let there be light !"  
Grim darkness felt his might,*

*And fled away ;*

*Then starbled seas and mountains cold  
Shone forth, all bright in blue and gold,  
And cried—" 'Tis day ! 'tis day ! "*

*By the swart artisan ! by God, our Sire !  
Our souls have holy light within,  
And every form of grief and sin*

*Shall see and feel its fire.*

*By earth, and hell, and heaven,  
The shroud of souls is riven !*

*Mind, mind alone*

*Is light, and hope, and life, and power !*

*Earth's deepest night from this bless'd hour,*

*The night of minds is gone !*

—The Press : EBENEZER ELLIOTT.

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MEMORANDA AND DIARY.

## AUGUST 16.

GABRIEL LIPPMANN.

*b. August 16, 1845.*

*d.*

French scientist and inventor. Gained his doctor's degree by a remarkable thesis on the relations between electric and capillary phenomena (1875). These studies led him to the invention of the capillary electrometer, an instrument of marvelous sensibility. He was interested in the photography of colors.

*Then mark the cloven sphere that holds  
All thought in its mysterious folds;  
That feels sensation's faintest thrill,  
And flashes forth the sovereign will;  
Think on the stormy world that dwells  
Locked in its aim and clattering cells!  
The lightning gleams of power it sheds  
Along its hollow glassy threads!*

—*The Living Temple*: HOLMES.

*You bid gold-leaves, in crystal lanterns held,  
Approach retracted, and recede repell'd;  
While paper-nymphs instinct with motion rise,  
And dancing fauns the admiring sage surprise.*

—*Botanic Garden*: DR. DARWIN.

1820.—The galvanometer was invented by Schweigger.

1827.—William Snow Harris invented the thermo-electrometer.

1873.—W. Grove's electro-induction balance was invented.

1855.—A large galvanometer made by William A. Cornell.

JEREMIAH CARHART.

*b. September 1813.*

*d. August 16, 1868.*

American inventor. He made several inventions during the years 1836-1846, including the exhaustion-bellows and tubular reed-board that are now used by all American makers of reed instruments. He manufactured melodeons, and afterwards, in addition to these and organs, he invented and manufactured ingenious machinery for making reeds and reed-boards for these instruments.

*The laboring classes,—so called in distinction  
from the idle people who only contrive the machinery  
and discover the processes and lay out the work  
and draw the charts and organize the various  
movements which keep the world going and make  
it tolerable.*

*The organ-blower works harder with his muscles  
than the organ-player, and may perhaps be ex-  
asperated into thinking himself a downtrodden  
martyr because he does not receive the same pay for  
his services.*

—*The Poet at the Breakfast-Table*: —HOLMES.

1470.—Beerhard invented the pedal to the organ.

1746.—The pedal harp was invented by J. P. Vetter at Nuremberg, Bavaria.

1790.—The glass harmonica, with glass tubes, was invented by Chladnitz.

1809.—The composition pedal in the organ was invented by Bishop; and in 1822 the wind regulator.

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MEMORANDA AND DIARY.

ROBERT WILLIAM BUNSEN.

b. *March* 31, 1811.

d. *August* 17, 1899.

German physicist and chemist. In 1846 he visited Iceland and investigated the geyser phenomena there. He discovered an infallible antidote to arsenous acid in iron-oxy-hydrate. He invented the "burner" that bears his name, and was the first to make real effective use of the magnesium light. In 1860, in collaboration with Kirchhoff, he discovered spectrum analysis, and pointed out for the first time the existence of two new chemical elements, caesium and rubidium, which he isolated. He also discovered the so-called Galvanic element. His carbon battery was first brought out in 1842.

*Whose hand is on the throttle of Advance,  
Save his upon whose sturdy open brow  
There gleams the sweat of strong productive toil?  
He is the lord and ruler of all lands,  
Whose lightest word commands the elements,  
Who summons Nature to his beck and call,  
And whose most faithful servant is Truth—  
Who labors, labors to a noble end!*

—*The Maker's Image*: ALBERT C. ANDREWS.

1665.—Professor Grimaldi of Bologna first observed diffraction of light; it was explained by Fresnel in 1819.

1777.—Scheele discovered that the violet rays of the spectrum possessed greater chemical power than any other.

1800.—Herschel discovered dark heat-rays.

1802.—Dr. William Hyde Wollaston observed dark lines, Fraunhofer's lines, in the solar spectrum.

PETER COLLIER.

b. *August* 17, 1835.

d.

American chemist. In 1883 he invented and patented an apparatus for recovering sugar from bagasse, or refuse of the sugar-cane and sorghum. He has published many reports and articles on fertilizers and on sorghum.

*Toiling, boiling, sugaring,  
On through the week he goes.  
Each evening sees a task begin  
That morning doesn't close.  
He grabs his buckets and prepares  
For one more day of woes.*

*Thanks, thanks to thee, my old-time friend;  
The world cannot gainsay  
That your big iron pot turns out  
Straight goods, though, well-a-day;  
'Tis precious little from your pot  
That ever comes our way.*

—*The Village Sugarmill*: CHICAGO TRIBUNE.

*Whilst the exploits of the conqueror and the intrigues of the demagogue are faithfully preserved through a succession of ages, the persevering and unobtrusive efforts of genius, developing the best blessings of the Deity to man, are often consigned to oblivion.*

—DAVID MUSER.

1148.—The sugar-cane was introduced from Syria to Cyprus.

1148.—Sugar-cane culture was introduced into Sicily.

1717-44.—The sugar-cane was introduced into Japan.

1747.—Beet-root sugar was first produced by Andreas Marggraf, the chemist.



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MEMORANDA AND DIARY.

## AUGUST 18.

ELI WHITNEY BLAKE.

*b. January 27, 1795.*

*d. August 18, 1886.*  
American inventor. He assisted Eli Whitney in erecting and organizing the gun-factory at Whitneyville, and there made important improvements in the machinery and in the processes of manufacturing arms. In 1836 he was joined by two brothers, and the factory at Westville was established for the production of door-locks and latches of their own invention. In 1857 Blake invented the Blake stone-breaker or crusher.

*But never a word have the people heard  
Of the men who made the guns.  
The master mind that fashions the bore,  
The moulder down in the rounded pit;  
The force and science that turn the core,  
Logic and study to make them fit.*

*These sturdy, silent and plodding ones,  
On the turn of their skill in final test,  
These grimy toilers who made the guns,  
The fate of a nation oft may rest.*

— F. B. M.

1824.—Firearms were used in the defense of Metz.

1471.—Hand guns were used by 800 Flemings who accompanied Edward IV. of England when he landed at Ravenspur.

1543.—The first cannon cast in England was made at Uckfield, Sussex, by Hugget. Mortars were also cast.

1544.—Pistols were first used by the cavalry of England.

MATTHEW BOULTON.

*b. September 3, 1728.*

*d. August 18, 1809.*  
English engineer, a partner of James Watt, whose steam engine was introduced through Boulton. Together they invented a method of copying oil paintings with great fidelity, and Mr. Boulton discovered a method of raising water and other fluids by impulse. He was connected with the reform of copper coinage, and in 1788 he set up several coining presses at Solihy to be worked by steam; these presses were patented in 1790. After making large quantities of coins for the East India Company for foreign improvements, he undertook, in 1797, the production of a new copper coinage for Great Britain. He supplied machinery to the new mint on Tower Hill, commenced in 1805.

*All is waste and worthless, till  
Arrives the wise selecting will,  
And, out of slime and chaos, Writ,  
Draws the threads of fair and fit.  
Then temples rose, and towns, and marts,  
The shop of toil, the hall of arts;  
Then flew the sail across the seas  
To feed the North from tropic trees;  
The storm-wind wove, the torrent span,  
Where they were bid the rivers ran;  
New slaves fulfilled the poet's dream,  
Galeonic wire, strong-shouldered steam.*

— WEALTH: EMERSON.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

# AUGUST 19.

JAMES NASMYTH.

b. August 19, 1808.

d. May 7, 1890.

Scotch inventor of the steam-hammer. His spare time in youth was spent in a large iron foundry or in the chemical laboratory of a school friend. He made models of steam engines to illustrate the lectures given at mechanics' institutions. In 1821 he was a student at the Edinburgh School of Arts. The invention of the steam-hammer was called forth in 1839 by an order for a large paddle-shaft for a British steamship then being built at Bristol. He invented the nut-shaping machine. He seems to have been the first to suggest the use of a submerged chain for towing boats on rivers and canals. He contrived a rough hydraulic punching machine by which he was enabled to punch a hole through a block of iron five inches thick. He patented improvements in the construction of fire-proof flooring and roofing. These improvements consist in constructing the roofs and floors of iron plates.

*Thus when of old, as mystic bards presume,  
Huge Cyclops dwelt in Etna's rocky womb,  
On thundering anvils rung their loud alarms,  
And leagued Vulcan forged immortal arms;  
Descending Venus sought the dark abode,  
And sooth'd the labours of the grisly god.  
While frowning loves the threatening falchion wield,  
And tittering Graces peep behind the shield,  
With jointed maits their fairy limbs o'erwhelm,*

JOHN FLAMSTEED.

b. August 19, 1646.

d. December 31, 1719.

English astronomer and the first astronomer royal. He appears to have been the first modern astronomer who understood the theory of the equa- tion of time, on which subject he published a practical demonstration about 1667. He determined the position of 2,884 stars. The results of his labors were published in 1725, with the title of "Celestial History." This work surpassed all former per- formances of the kind, contained the first accurate catalogue of the stars and is one of the richest con- tributions ever made to practical astronomy.

*Flamsteed and Newton look with brows unclouded,  
Their strife forgotten with its faded scars,—  
Titans who found the world of space too crowded  
To walk in peace among its myriad stars.  
—A Welcome to Benjamin Apthorpe Gould.*

*Or nod with pausing step the plumed helm;  
With radiant eye she view'd the boiling ore,  
Heard undismay'd the breathing bellows roar,  
Admired their sinewy arms, and shoulders bare,  
And ponderous hammers lifted high in the air,  
With smiles celestial bless'd their dazzled sight,  
And Beauty blazed amid infernal night.  
—Vulcan and His Sons, Botanic Garden; Dr. DARWIN.*

1838.—There was a great revolution in the manufactures of the world by the invention of the steam-hammer.

1904.

FRIDAY.

1904.

MEMORANDA AND DIARY.

# AUGUST 20.

JOHAN JAKOB BERZELIUS.

b. August 20, 1779.

d. August 1848.

Swedish chemist. He was distinguished by his skill and precision as an analyst, and enriched many departments of chemistry by his researches. He contributed much to perfect the atomic theory, after Dalton. He discovered cerium in 1803, selenium in 1817, silicon 1818, tantalum columbium 1824, thorium 1828 and zirconium 1844. It was his researches that gave the first impulse to modern organic chemistry. We owe to him a greater number of accurate analyses than to any other chemist of his time. His greatest work is "System of Chemistry" (1808-18).

*Nymphs! you disjoin, unite, condense, expand,  
And give new wonders to the Chemist's hand;  
On tepid clouds of rising steam aspire,  
Or fix in sulphur all its solid fire;  
With boundless spring elastic airs unfold,  
Or fill the fine vacuities of gold;  
With sudden flash vitrescent sparks reveal,  
By fierce collision from the flint and steel.*

—Botanic Garden; DR. DARWIN.

1789.—Uranium was discovered by Klaproth.

1798.—Chromium and beryl were discovered by Louis Nicolas Vauquelin.

1803.—Osmium was discovered by Tennant.

1804.—Phodium was discovered in platinum ore by Dr. Wollaston.

HENRY D. STONE.

b. August 20, 1815.

d.

1898.

American inventor. In 1858 he patented the turret machine which resulted from observing a revolving head used on a bolt cutter. He produced a turret machine in the form of a lathe, having a work-carrying spindle, a cross slide on the lathe shears carrying two tool posts in the rear of the spindle axis, and having, in place of the tail spindle, a substantial slide of considerable traverse parallel to the spindle axis, and carrying a turret supported on a vertical axis, and capable of being automatically turned and locked. This amplified the powers of the self-acting lathe.

*Where the fire is brightly glowing,  
By the furnace and the mold,  
Where the lurid flame is flowing,  
Labor's songs are sung and told.  
Where the hammers ply the quickest,  
And the anvil's notes resound,  
Where the sparks are flying thickest,  
There do labor's songs abound.*

—Labor's Songs.

*Founders and senators of states and cities, lawgivers, exponents of tyrants, fathers of the people, and other eminent persons in civil government, were honored but with titles of Worthies or Demigods; whereas, such as were inventors and authors of new arts, endowments, and commodities towards man's life, were ever consecrated amongst the gods themselves.*

—BACON.

1904.

SATURDAY.

1904.

MEMORANDA AND DIARY.

## AUGUST 21.

WILLIAM MURDOCH.

*b. August 21, 1754. d. November 15, 1839.*

English machinist. Made many improvements in Watt's steam engine. He invented a compressed air engine, a steam gun, several machines for boring metallic cylinders and the atmospheric railway. He suggested the pneumatic tube for sending parcels. In 1792, at Cornwall, he invented the present apparatus for extracting gas from coal by raising it to a high temperature without permitting combustion. In 1802 the first public display of gas lights was made at Boulton and Watt's foundry at Birmingham. In 1813 London Bridge was lighted by gas; Paris adopted the new light in 1820; Baltimore in 1816; but as late as 1822 New York was lighted with oil and with gas some years later. Murdoch first treated muncie and obtained patent for ships' bottoms (1791); in 1810 he patented his stone pipes, and devised apparatus for utilizing the force of compressed air. Iron cement, a mixture of sal-ammoniac and iron filings is attributed to him. On July 29, 1892, the centenary of gas-lighting was celebrated.

*The spirit of Paley's maxim, that "he alone discovers who proves," is applicable to the history of inventions and discoveries; for certainly he alone invents to any good purpose who satisfies the world that the means he may have devised have been found competent to the end proposed.*

—DR. SAMUEL BROWN.

GUSTAVE ADOLPH HIRN.

*b. August 21, 1815. d. January 14, 1890.*

French physicist. He was a co-discoverer with Joule and Mayer of the mechanical equivalent of heat, and founder of a new experimental method of accounting for the heat given to an engine. He founded a school of experimental science, the Alsatian School. His greatest and last book is "Constitution de l'Espace Celeste."

*The successful construction of all machinery depends on the perfection of the tools employed; and whoever is a master in the arts of tool-making possesses the key to the construction of all machines. . . . The contrivance and construction of tools must therefore ever stand at the head of the industrial arts. —O. BARBAGE.*

*The mother of true wisdom is the will; The noblest intellect, a fool without it. World-wisdom much has done, and more may do, In arts and sciences, in wars, and peace; And make thee twice a beggar at thy death. —Night Thoughts; YOUNG.*

1688.—Denis Papin invented a heat-engine.

1698.—He attempted to construct an engine. He devised a steam-engine while residing in Germany.

1698 —Thomas Savery invented a heat-engine. He also suggested the use of heat as a motive power.

1853, January 4.—Captain John Ericson exhibited a vessel in which caloric, or heat, was motive power. Caloric ship "Ericsson" made a trial trip on Potomac January 11.



1904.

SUNDAY.

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MEMORANDA AND DIARY.

## AUGUST 22.

HENRY MAUDSLAY.

*b. August 22, 1771. d. February 14, 1831.*

English metallurgist and inventor. Bramah said that to Maudslay's skill in contriving the machines for manufacturing his locks on a large scale belonged the success of his own invention. He invented the slide-rest in the lathe and rendered it one of the most important of machine tools. He made improvements in the steam-engine, and his engine was the first move toward what are now called direct-acting engines. He invented a machine for punching boiler-plates. To the tools, of which he furnished the prototypes, we are indebted for the perfection of our textile machinery, locomotives, marine engines and the various implements of art, agriculture and of war.

*The grim mechanic waved a hardened hand—  
Behold, on every side his trophies stand!  
The new-made plow, with curving iron beam,  
The thrasher with its snowy plume of steam;  
The cultivator, striped, gay, and proud,  
With new ideas and dental wealth endowed;  
The windmill, now once more at work for men,  
Like some old help discharged and hired again.*

*The reaper, resting idly on his wheel,  
Held forth a murderous arm of iron and steel,  
And seemed to think 'twas waiting over-long  
Before it might begin its rattling song.*

—*Dialogue of the Horses*: WILL CARLETON.

SAMUEL PIERMONT LANGLEY.

*b. August 22, 1834. d.*

American astronomer and physicist. Secretary of the Smithsonian Institution at Washington. He built the aerodrome, a flying machine with wings, driven by a steam-engine, and wholly without gas or other lifting power beyond its own internal energy. He was so successful that the United States made an appropriation to enable him to continue his experiments. He applied mathematics to prove that a machine could be made to fly. He investigated the theory of the flight of birds, and, after many failures, succeeded in flying May 6, 1896. His and Maxim's have been the greatest efforts to utilize the soaring plane. In 1869 he founded the railway time service from observatories. He devised the bolometer and made brilliant researches on the sun.

*Brutes find out where their talents lie;  
A bear will not attempt to fly;  
But founder'd horse will oft debate  
Before he tries a fine barr'd gate;  
A dog by instinct turns aside  
Who sees the ditch too deep and wide;  
But man we find the only creature  
Who, led by folly, combats nature;  
Who, when she loudly cries—'forbear,  
With obstinacy faces there;  
And, where his genius least inclines,  
Absurdly bends his whole designs.*

—*Swift on Poetry*.

1904.

MONDAY.

1904.

MEMORANDA AND DIARY.

## AUGUST 23.

GEORGES LEOPOLD CHRETIEN FREDERIC CUVIER.

*b. August 23, 1769. d. May 13, 1832.*

French philosopher and naturalist. He produced in 1816 his "Animal Kingdom" by which he made a new arrangement of animals into four divisions, the Vertebrata, the Mollusca, the Articulata, and the Radiata. He is considered the founder of the science of comparative anatomy. He made great discoveries and classifications in geology.

*Almighty Cause! 'tis thy preserving care  
That keeps thy works for ever fresh and fair;  
Hence life acknowledges its glorious Cause,  
And matter owns its great Disposer's laws;  
Hence flow the forms and properties of things;  
Hence rises harmony, and order springs.  
Thy watchful providence o'er all intends;  
Thy works obey their great Creator's ends,  
Thee, Infinite! what finite can explore!  
Imagination sinks beneath thy power.  
Yet present to all sense thy power remains,  
Reveal'd in Nature, Nature's Author reigns.*

—BOYSE.

*Instead of feeling a poverty when we encounter a great man, let us treat the new-comer like a travelling geologist, who passes through our estate, and shows us good slate, or limestone, or anthracite, in our brush pasture.* —EMERSON.

1737-1814.—Saint-Pierre de Jacques Henri Bernardin lived. He is best known as the author of "Studies of Nature."  
1801.—Abbe Rene Just Haüy published his treatise on "Mineralogy."

CHARLES AUGUSTIN DE COULOMB.

*b. June 14, 1736. d. August 23, 1806.*

French engineer and electrician. He made important investigation of the distribution of electricity and the measurement of electric forces. He invented the torsion balance, and by means of this he established experimentally the law known as Coulomb's law, that the force exerted between two charges of electricity is directly proportional to their product and inversely proportional to the square of the distance between them. In recognition of his services the electro-magnetic unit of quantity has been called the "Coulomb."

*"What were they?" you ask; you shall presently see;  
These scales were not made to weigh sugar and tea;  
Oh no; for such properties wondrous had they,  
That qualities, feelings and thoughts they could weigh;  
Together with articles small or immense,  
From mountains or planets to atoms of sense.*

*Naught was there so bulky but there it would lay,  
And naught so ethereal but there it would stay,  
And naught so reluctant but in it must go—  
All which some examples more clearly will show.*

—The Philosopher's Scales: JANE TAYLOR.

1802.—Romagnosi of Trent observed that a wire conveying a current would deflect a compass needle.

1830.—Oersted discovered the principle of the galvanometer.

1904.

TUESDAY.

1904.

MEMORANDA AND DIARY.

## AUGUST 24.

JOSEPH BUCHANAN.

b. August 24, 1785.

d. September 29, 1829.

American inventor who studied medicine. Among his inventions is a new musical instrument in which the notes are produced by glasses of different chemical composition; also a steam engine with which, in 1824, he ran a wagon through the streets of Louisville, Ky. He claimed to have discovered a new motive power derived from combustion without the aid of water and steam which is now utilized in the air engines of John Ericsson and others. He also originated what he called "the music of light," to be produced by means of "harmonic colors luminously displayed." He was the author of the "Philosophy of Human Nature" (1812).

*Why, man of idleness, labor has rocked you in the cradle, and nourished your tempered life; without it, the woven silk and wool upon your vest would be in the shepherd's fold. For the mearest thing that ministers to human want, save the air of heaven, man is indebted to toil; and even the air, in God's wise ordination, is breathed with labor.*

—CHAPIN.

*The idea of an artificial tone system is thoroughly incompatible with our reason; a regular tone system has no more been invented by the musicians than poets invented the words of their language and the grammatical combinations of those words.*

—DR. HAUPTMANN.

CHARLES FOLLEN McKIM.

b. August 24, 1847.

d.

Harvard L. S. S., 1866-67.

American architect. The head of the firm of McKim, Mead and White, professional architects. Among their best productions are the cottages erected at Newport and other summer resorts. Among their city residences are the Tiffany house on Madison avenue, the Villard block of houses on Madison avenue, and the Madison Square Garden in the City of New York. They also built St. Paul's Church in Stockbridge, Mass., and St. Peter's in Morristown, N. J., and the Boston Public Library, and many other beautiful structures.

*Build deep, and high, and broad, young man,*

*As the needful case demands;*

*Let your title-deeds be clear and bright,*

*Till you enter your claim to the Lord of Light,*

*For the "House not made with hands."*

—Packard's Monthly.

*'Tis madness to build high with stone and time*

*Great houses, that may seem the clouds to climb,*

*With spacious halls, targe galleries, brave rooms,*

*Fit to receive a king, peers, squires, and grooms.*

—A Very Old Man; JOHN TAYLOR.

1174.—The campanile of Pisa was begun; it leans 13 feet 3 inches.

1354.—The Doge's Palace in Venice was begun (the present building).

1589.—The Bridge of Sighs at Venice was built.

1904.

WEDNESDAY.

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MEMORANDA AND DIARY.

## AUGUST 25.

JAMES WATT.

b. *January 19, 1736.*

English inventor and mechanic; also a civil engineer. From a skillful workman he became an engineer of the first order; he invented a plan for completely condensing the vapor in Newcomen's atmospheric engine without cooling the cylinder. This was effected by means of a condenser detached from the cylinder; he then added a pump, put in motion by the engine itself. In 1764 he succeeded in the completion of the true steam-engine.

*Steam was, till the other day, the devil which we dreaded. But the Marquis of Worcester, Watt, and Fulton, bethought themselves, that where was power, was not devil, but was God; that it must be availed of, and not by any means let off and wasted. Could he lift pots and roofs and houses so handily? he was the workman they were in search of. He could be used to lift away, chain, and compel other devils, far more reluctant and dangerous, namely, cubic miles of earth, mountains, weight or resistance of water, machinery, and the labors of all men in the world; and time he shall lengthen, and shorten space.* —Fate: EMERSON.

1690.—Denys Papin employed in his experiments every principle of the low-pressure engine, using the cylinder and piston, but no boiler; having generated the steam in the cylinder itself.

1774.—The Birmingham steam-engine works were established.

1792.—Watt patented the working of steam expansively.

JOHN ARNOLD.

b. 1744.

d. *August 25, 1799.*

English horologer and inventor; one who made great improvements in the chronometer. He was patronized by George III. Among his improvements are the detached escapement, the expansion balance and the cylindrical balance spring.

*Integrity was the "Main-spring,"  
And Prudence the "Regulator" of all the  
Actions of his life.*

*Humane, generous, and liberal,  
His "Hand" never stopped  
Till he had relieved distress.*

*So sincerely "regulated" were all his movements,  
That he never "went wrong,"  
Except when "set agoing" by People  
Who did not know "His Key."*

—A Watchmaker's Epitaph.

158 B. C.—Scipio Nasica invented water-clocks, by means of which day and night were first divided at Rome.

140 B. C.—Ctesibius invented the water-clock called clepsydra which contained toothed wheels.

760.—The only clock in the world (so far as now known) was sent to Pepin by Pope Paul I.

802.—Charlemagne was presented with a striking clock by Harun-al-Raschid the (famous) calif of Bagdad.

1000.—The application of escapement to clocks was devised by Gerbert (Pope Sylvester II.).

1658.—Pocket watches were first made.



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MEMORANDA AND DIARY.

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# AUGUST 26.

FELIX ARCHIMEDE POUCHET.

b. August 26, 1800.

d. December 6, 1872.

French naturalist and physiologist. He acquired distinction by his numerous works, and to him belongs the honor of having formulated the fundamental laws of fecundation among the mammifera. His experiments on spontaneous generation, in opposition to those of Pasteur, had great celebrity. He was the director of the Museum of Natural History at Rouen, and in 1867 published "The Universe."

*Every act of the man inscribes itself in the memories of his fellows, and in his own manners and face. The air is full of sounds, the sky of tokens; the ground is all memoranda and signatures, and every object covered over with hints, which speak to the intelligent.*

—Representative Men: EMERSON.

*Observe the rising Lily's snowy grace,  
Observe the various vegetable race,  
They neither toil nor spin, but careless grow,  
Yet see how warm they blush! how bright they glow!  
What regal vestments can with them compare,  
What kind so stinky, what queen so far?*

*The petal, stamen, and the pistil trace  
Of common blossoms and of unknown race;  
The first well pleased you mark with grateful sight,  
And view the last with hope's bewitching light,  
What sudden pleasure when some object rare,  
Confined peculiar to one soil and air,  
More precious far from expectation grown,  
By some blessed turn upon the sight is thrown.*

—DELILLE.

JOSHUA C. STODDARD.

b. August 26, 1814.

d.

American inventor. He was educated at the public schools and became noted as an apiarist. He also turned his attention to inventing and in 1856 he devised the steam-calliope which is used on Mississippi steamers. He also invented the Stoddard horse-rake and hay-tedder. More than 100,000 of his rakes are now in use.

*The fruitful herbage now invites the scythe—  
In eager contest strive the swains all blythe,  
Who works the fastest, or who cuts more deep,—  
The waving sword yields to the mower's sweep.*

*The lads and lasses all prepare for work,  
Some take refreshment, some the rake or fork.*

*A plenteous crop in even rows laid down—  
Off goes the jacket—off the homespun gown:  
Each one following in a single file,  
Some turn the herbage, some the hay-cocks pile;  
Till faint, beneath the shade a timely rest,  
And healthy meal, renew for work the zest;  
Nor men's ry e'er can touch a livelier strain  
Than that which rustles carol o'er the plain.*

1871.—Hector A. Holmes invented a twine grain binder.

1878, August 6.—McCormick's automatic self-binding grain harvester took gold medal at Royal Agricultural Society's competitive test.

1892.—Deering first introduced roller and ball bearing in harvesting machinery.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

# AUGUST 27.

FIZIANO TITIAN OF TISIANO VECELLI.

- b. 1477. d. August 27, 1576.
- The greatest painter of the Venetian school. In 1512 he was employed by the Venetian government to paint the hall of the grand council, in which he represented the "Homage of Frederick Barbarossa to the Pope." In 1516 he painted a celebrated picture of the "Assumption of the Virgin" and in 1538 "The Death of Saint Peter." As a portrait painter he has never been surpassed and many critics think he was the greatest colorist that ever lived.

*The golden light into the painter's room  
Streamed richly, and the hidden colors stole  
From the dark pictures radiantly forth,  
And, in the soft and dewy atmosphere,  
Like forms and landscapes magical, they lay.  
And as the painter's mind felt through the dim,  
Rapt mystery, and plucked the shadows wild  
Forth with its reaching fancy, and with form  
And color clad them, his fine, earnest eye  
Flashed with a passionate fire, and the quick curl  
Of his thin nostril, and his quivering lip,  
Were like the winded god's, breathing from his flight.*

—PARRHASIUS: N. P. WILLIS.

1390 (about)—1440 (about).—John Van Eyck lived. He was the first to use oil for painting, in Flanders. He and his brother Hubert attained great success in oil-painting, having discovered a new vehicle of color composed of siccativ oils and resins. He improved linear and aerial perspective and painting upon glass.

CELLINI BENVENUTO.

- b. 1500. d. 1570.

An artist of the first order, who gave his art a brilliancy it had never before possessed and which has never since been surpassed.

*Yes! fair creations, to perfection wrought,  
Embodied visions of ascending thought  
Forms of sublimity! by Genius traced,  
In tints that vindicate adoring taste;  
Whose bright originals, to earth unknown,  
Live in the spheres encircling Glory's throne;  
Models of art, to deathless fame consigned,  
Stamped with the high-born majesty of mand.  
—The Restoration of Works of Art to Italy; MRS. HEMANS.*

332 B. C. (about).—Apelles, of Colophon, Ionia (the most celebrated of Grecian painters), painted a portrait of Philip V. of Macedon and Alexander the Great and the picture Venus Anadyomene.

200 B. C.—Ultramarine was known.

1436–1516, November 29.—Giovanni Bellini lived. The founder of the Venetian school. He assisted in the embellishment of the senate-house at Venice. Titian was one of his pupils.

1514.—Raffael was appointed architect of St. Peter's.

1547.—Michael Angelo made architect of St. Peter's.

1580.—Monks at Pisa invented carmine.

1609.—Rubens was made court painter by the Archduke Albert of Antwerp.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

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## AUGUST 28.

(EILHARD) MITSCHERLICH.

*b. January 7, 1794. d. August 28, 1863.*

German chemist. He made the important discovery known as the "Law of Isomorphism," according to which atoms of elements of the same class may replace each other in a compound without altering its crystalline structure. This discovery proved valuable in the field of mineralogy as well as in chemistry. Later he discovered "dimorphism" and his improvements in the reflecting goniometer enabled him to observe the unequal variations of angles by heat. His researches in benzine and ether led him to the discovery of the "Contact-theory." He also discovered selenic acid and hypermanganic acid. He made researches in lead-chamber-crystals and invented a method for detecting phosphorus. He discovered phenol and nitrobenzine in 1834 and he also discovered benzole, nitrobenzole and azobenzole.

*Men perished in winter winds till one smote fire  
From flint stones coldly hiding what they held;  
The red spark treasured from the kindling sun;  
They gorged on flesh like wolves, till one sowed corn  
Which grew a weed, yet makes the life of man;  
They mowed and babbled till some tongue struck speech,  
And patient fingers framed the lettered sound  
What good gift have my brothers, but it came  
From search and strife and loving sacrifice?*  
—ERWIN ARNOLD.

HAYWARD AUGUSTUS HARVEY.

*b. January 17, 1824. d. August 28, 1893.*

American inventor. He took out patents for improvements in cutting screws and rolling screws, bolts and bolt machinery. He invented a new process for the manufacture of steel.

*The Leaders of Industry, if Industry is ever to be led, are virtually the Captains of the World; if there be no nobleness in them, there will never be an Aristocracy more. But let the Captains of Industry consider: once again, are they born of other clay than the old Captains of Staghunter; doomed forever to be no Chivalry, but a mere gold-plated Doggery,—what the French well name Canaille, "Doggery," with more or less gold carrion at its disposal? Captains of Industry are the true Fighters, henceforth recognizable as the only true ones: Fighters against Chaos, Necessity and the Devils and Jotuns: and lead on Mankind in that great, and alone true, and universal warfare: the stars in their courses fighting for them, and all Heaven and all Earth saying audibly, Well done! Let the Captains of Industry retire into their own hearts and ask solemnly if there is nothing but vulturous hunger, for fine wines, violet reputation and gilt carriages, discoverable there.*

—Past and Present: CARLYLE.

1818, December 7.—1893, January 19.—George Francia Willson lived. In 1855 he began the manufacture of chemicals, which business became the Rumford Chemical Works. He invented an improvement in the manufacture of steel, a revolving boiler for paper manufacture and several improvements in illuminating apparatus for lighthouses. He devoted considerable attention to agriculture.

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MEMORANDA AND DIARY.

## AUGUST 29.

CHRISTIAN FREDERICK SCHOUBEIN.

*b. October 18, 1799.*

*d. August 29, 1868.*

German chemist who discovered ozone in 1839. In 1846 he made the discovery of nitro-saccharin and nitro-fibrin or gun-cotton. He published "Contributions to Physical Chemistry" (1844) and other works.

*You, with nice eye the slow solution watch,  
With fostering hand the parting atoms catch,  
Join in new forms, combine with life and sense,  
And guide and guard the transmigrating Ens.*  
—*Botanic Garden; DR. DARWIN.*

*In the smoke and dust of the workshop's must,  
Their lives are known to few;  
Yet theirs the cunning and skill we trust  
For the deeds the fighters do—  
The master mind that fashions the bore,  
The moulder down in the rounded pit;  
The force and science that turn the core,  
Logic and study to make them fit.—  
—The Men who Made the Guns; F. B. M.*

800.—*Marcus Græcus* made gun-powder.

1280.—The Moors used gun-powder in Spain.

1330.—Gun-powder was known to Roger Bacon and to Schwarz.

1340.—Gun-powder was first used at the battle of Crecy.

1833.—Gun-cotton is also claimed to have been produced by Bracconot.

HERMANN JOHANN PHILIPP SPRENGEL.

*b. August 29, 1834.*

*d.*

German physicist. He discovered a new method of producing vacuum, viz., by the fall of water or mercury in tubes, a method distinguished by its convenience and effectiveness. In 1870 his mercury air-pump produced almost a perfect vacuo. The most important of his researches refer to the two extremes in the gaseous state of matter, vacua and detonating agents. He experimented with explosives. He was the first who described the method now called "cumulative detonation," by means of which all semi-sensitive explosives, if exploded by concussion, may readily be exploded; gun-cotton has since been exploded by this method. In 1893 he was a Royal Prussian Professor.

*Sylphs! you, retiring to sequester'd bowers,  
Where oft your Priestley woos your airy powers,  
On noiseless step or quivering pinion glide,  
As sits the Sage with Science by his side;  
To his charm'd eye in gay undress appear,  
Or pour your secrets on his raptur'd ear.*  
—*Botanic Garden; DR. DARWIN.*

1813, April 26.—Edward Maynard was born. He devised many methods and instruments in connection with dentistry, also in firearms. The latter include a system of priming to take the place of the percussion cap, 1848; the Maynard breech-loading rifle, 1851-1859; a method of converting muzzle-load-arms into breech-loaders, 1860; and a device for joining two gun-barrels so that they may expand or contract endwise independently.



1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

# AUGUST 30.

SIR JOHN RENNIE.

b. August 30, 1794.

d. September 3, 1874.

British engineer. Erected London Bridge from designs prepared by his father. The bridge was opened in 1831. He completed the great break-water at Plymouth, of which he published an "Account" in 1848. In conjunction with Telford he constructed the Nene outfall near Wisbech (1828-1831). He also restored the harbor of Boston in 1827-1828 and made various improvements on the Welland Canal.

*Upon the pier stood two stern-visaged men,  
Looking to where a little craft lay moored,  
Swayed by the lazy current of the Thames.  
The younger had an aspect of command.—  
Not such as trickles down, a slender stream,  
In the shrunk channel of a great descent,  
But such as lies enowdered in heart and head,  
And an arm prompt to do the 'nests of both.  
Has was a brow where gold were not the place,  
And yet it seemed right worthy of a crown.  
(Though he despised such), were it only made  
Of iron, or some serviceable stuff  
That would have matched his brownly rugged face.*

—A Glance Behind the Curtain: LOWELL.

1014.—A bridge of the Thames River, London, was built of wood. 1078.—Another was built by Peter Colechurch.

1738, September 13.—The Westminster bridge was begun in London.

1799.—The stone bridge of Kelso was commenced in Scotland by John Rennie.

ALBIGENCE WALDO CARY.

b. May 23, 1801.

d. August 30, 1862.

American inventor of Cary's rotary force-pump, which was used on the first steam fire-engine in the United States. He was employed in reconstructing the Southern Railway after the Civil War and also in the mines of California.

*While with east strides and bristling hair aloof  
Pale Danger glides along the falling roof;  
And Giant Terror, howling in amaze,  
Moves his dark limbs across the lurid blaze.  
Nymphs! you first taught the gelid wave to rise,  
Hurt'd in resplendent arches to the skies;  
In iron cells condensed the airy spring,  
And imp'd the torrent with unfailing wing;  
On the fierce flames the shower impetuous falls,  
And sudden darkness shrouds the shatter'd walls;  
Steam, smoke, and dust, in blended volumes roll,  
And Night and Silence repossess the Pole.*

—Botanic Garden; DR. DARWIN.

1518.—Fire-engines were first made at Augsburg, Bavaria.

1672.—Hose for fire-engines were invented by Van der Heyde.

1720.—Canvas hose woven without seam was invented by Bok at Leipsic.

1731.—First fire-engines introduced and department organized in New York.

1892 B. C.—Wells were dug by Abraham and by Isaac in 1894 B. C.

1904.

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MEMORANDA AND DIARY.

## AUGUST 31.

GUILLAUME AMONTONS.

b. August 31, 1663. d. October 11, 1705.

French mathematician and inventor. Early in youth he became deaf and being thus partly cut off from society he sought to cultivate his talents. He learned drawing and architecture and was employed on several public works; he gave his attention to mechanics and natural philosophy. He made improvements in barometers, thermometers and hydrometers and was the original inventor of the telegraphic art. His plan was to transmit signals from station to station by the aid of the telescope; it was not adopted generally until fifty years later.

*The Infinite speaks in our silent hearts,  
And draws our being to himself, as deep  
Valleth unto deep. He who all thought imparts,  
Demands the pledge, the bond of soul to keep;  
But reason, wandering from its fount afar,  
And stooping downward, breaks the subtle chain  
That binds it to itself, like star to star,  
And sun to sun, upward to God again.*

—MRS. E. OAKES SMITH.

1763-1806, January 23.—Claude Chappe lived. He first brought to perfection the semaphore in 1794; it was the most important instrument of the kind and was generally used for telegraphic purposes until it was supplanted by the electric telegraph.

1815, May 25.—Giovanni Caselli was born. He was an Italian priest and physicist and gave special attention to electricity and invented a telegraph by which messages could be transmitted in the sender's handwriting.

HERMANN LUDWIG FERDINAND HELMHOLTZ.

b. August 31, 1821. d.

German physiologist, mathematician and natural philosopher. His investigations in physiological optics, with his invention of the ophthalmoscope in 1852, effected a revolution in this branch of medical science and art.

*And oh! when thought, in ecstasy sublime,  
That soars triumphant o'er the bounds of time,  
Fires thy keen glance with inspiration's blaze,  
The light of heaven, the hope of nobler days,  
(As glorious dreams for utterance far too high,  
Flash through the mist of dim mortality!)  
Who does not own, that through thy lightning beams  
A flame unquenchable, unearthly, streams?  
That pure, though captive effluence of the sky,  
The vestal-ray, the spark that cannot die.*

—To the Eye: MRS. HEMANS.

120 (about).—Ptolemy wrote a treatise on optics.

1285.—Spectacles were invented by Alexander di Spina, a monk at Florence. 1300.—They were ascribed to Salvinus Armatus of Pisa.

1688.—Cast mirrors were invented.

1898.—Prof. Wheatstone exhibited his reflecting stereoscope to the Royal Society.

1847.—Donders published the Law of Douder and introduced prismatic and cylindrical eye-glasses.

1859.—Gustav Kirchhoff and Robert Bunsen invented the spectroscope.

1904.

WEDNESDAY.

1904.

MEMORANDA AND DIARY.

# SEPTEMBER 1.

SIR RICHARD WESTMACOTT.

- b. 1775. *d. September 1, 1856.*  
English sculptor. Among his masterpieces are "Euphrosyne," "Psyche," "Nymph Unclassing Her Zone," a "Peasant Maiden" and "The Distressed Mother"; statues of Pitt and Addison, monuments of Sir Ralph Abercromby in St. Paul's Cathedral and of the Duke of York on the column at Waterloo Place and the bronze statue of George III. at Windsor.

*The world of art is an ideal world.*

*For those the sculptor's laurelled bust,  
The builder's marble piles,  
The anthers peaking o'er their dust  
Through long cathedral aisles.*

—HOLMES.

*Or if thy Genius e'er forget his chain,  
And reach impatient at a nobler strain,  
Soon the sad bodings of contemptuous mirth  
Shoot through thy breast, and stab the generous birth.*

*Can Art, alas! or Genius guide the heart,  
Where truth and freedom from the heart are fled?  
Can lesser wheels repeat their native stroke  
When the prime function of the soul is broke?*

—An Epistle to Curcio; AKENSIDE.

773 B. C.—Sculpture first mentioned in profane history, an Egyptian art.

SAMUEL BLODGET.

- b. April 1, 1734. *d. September 1, 1807.*  
American inventor and sub-marine engineer. In 1783, with an invention of his own, he raised a valuable cargo from a ship sunk near Plymouth. He established a duck factory in 1791. He began the canal that bears his name around Amoskeag Falls in the Merrimac.

*The proudest motto for the young, write it in lines of gold  
Upon thy heart, and in thy mind the stirring words enfold,  
And in misfortune's dreary hour, or fortune's prosperous  
gale,*

*'Twill have a holy, cheering power—there's no such word as fail.  
  
The wearied student, bending o'er the tomes of other days,  
And dwelling on their magic lore, for inspiration prays;  
And though with toil his brain is weak, his brow is deadly pale,  
The language of his heart will speak—there's no such word as fail.*

1460.—Printing in dyes was invented.

1610.—William Lee died. 1589, he invented the stocking-frame, an essential part of which is the loom.

1742.—Calico-printing was begun at Glasgow, Scotland.

1760.—Cotton-carding machines were invented by James Hargreaves.

1773.—Exporting machinery used in making cotton fabrics was prohibited.

1823.—Raw cotton was first imported from Egypt.

1904.

THURSDAY.

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MEMORANDA AND DIARY.

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## SEPTEMBER 2.

### WILLARD PARKER.

b. *September 2, 1800.* *d. April 25, 1884.*

American physician and surgeon. He made important discoveries in practical surgery, including that of cystotomy. In 1867 he urged that abscesses of the appendix veriformis should be operated on and the patient's life saved. This trouble was not rightly understood and treated until Fitz, of Boston, in 1888, published his paper on the subject. Parker's operation for laceration of the perineum during parturition was an important advance in surgery. He first called attention to the concussion of the nerves as distinguished from that of the nerve-centres. In 1854 he first described cases of malignant pustule.

*So, in descending streams, the silver Chyle  
Streaks with white clouds the golden floods of Bile;  
Through each nice valve the mingling currents glide,  
Join their fine rills, and swell the sanguine tide;  
Each countless cell, and veinless fibre seek,  
Nerve the strong arm and tinge the blushing cheek.*

—Botanic Garden: DR. DARWIN.

*Can storied urn, or animated bust,  
Back to its mansion call the fleeting breath,  
Can honour's voice provoke the silent dust?  
Or flattery sooth the dull, cold ear of death?*  
—Elegy in a Country Church Yard: GRAY.

*The spruce philosopher has found  
The source of the disease that nature feels,  
And bids the world take heart and banish fear.  
Thou fool! wilt thy discovery of the cause  
Suspend the effect, or heal it?*

### CROMWELL FLEETWOOD VARLEY.

b. *April 6, 1838.* *d. September 2, 1883.*

English electrician. In telegraphy he "killed" the wire by giving it a slight permanent elongation, breaking out the bad places and removing the objectional springiness which resulted from the drawing process. He devised a method of localizing the faults in submarine cables. On February 16, 1854, he patented his double current key and relay, which was followed by his polarized relay and the translating system for use in connection with the cables of the Dutch lines. In 1870 he patented an instrument which he called a cymaphen, which it is claimed contained the essentials of the modern telephone.

*Be firm! whatever tempts thy soul  
To loiter ere it reach its goal,  
Whatever siren voice would draw  
Thy heart from duty and its law,  
Oh, that distrust! Go bravely on,  
And, till the victor-crown be won.*

—Be Firm: MRS. S. C. MAYO.

1809.—Soemmering applied voltaic-electricity to telegraph purposes.

1829.—Schweigger modified Soemmering's instrument, using voltaic-electricity for telegraphing.

1838-43.—Gauss founded the mathematical theory of electricity.

1847.—Bain applied the method of impressing the symbols on paper by electro-chemical decomposition.

1881.—Kennedy discovered the law of fault resistance.



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FRIDAY.

1904.

MEMORANDA AND DIARY.

## SEPTEMBER 3.

EDWARD SPAULDING.

b. *September 3, 1824.*

American inventor. He was a blacksmith and machinist. He invented a graduated elliptic spring for carrying heavy loads, which is applicable to horse-cars or freight-cars, a wrought-iron shackle which is used in conjunction with his spring and a magnetic and electric ear telephone for enabling the deaf to hear more readily.

*Go light the roaring cities with the splendor of a dream,  
Pour out the shrieking marvels of the onward march of steam,  
Rejoice in grown, sweet splendors of time's widening liberty—  
The feeding of the hunger of the free that are not free—  
But distant far, beholding in our quiet trust we go,  
You and I, beloved, together, even so and even so!*

—FOLGER MCKINSEY.

*Thanks, thanks to thee, my worthy friend,  
For the lesson thou has taught!  
Thus at the flaming forge of life  
Our fortunes must be wrought;  
Thus on its sounding anvil shaped  
Each burning deed and thought!*

—The Village Blacksmith; LONGFELLOW.

1831.—Four-wheeled trucks first used on South Carolina R.R.

1832, May 12—1885, July 9.—Ezra Miller lived. He was an American inventor of car-coupling devices, including a trussed platform, compression buffers and an automatic coupler called the Miller-hook. See Wait's Car-builders' Dictionary. These were patented in 1864.

JOHN WORRALL KEELY.

b. *September 3, 1837.*

American inventor. He pretended to have invented a "hydro-pneumatic-pulsating vacuo-machine," whose action it was claimed produced forces obtained from water and air. At his death his pretended discoveries were shown to be a gigantic swindle.

*Sin has many tools, but a lie is the handle which  
fits them all.*

—The Autocrat of the Breakfast-Table; HOLMES.

*Laughter and youth and wonder, wonder and fancy and joy;  
Play, play, if ever ye may, ere greed or need can cloy,  
For under the hills the monster's wheels turn ever without  
surcease;  
And the day ye fall in the work-world's thrall, that day shall  
end your peace.*

—JO WILKES.

*Talents angel-bright,  
If wanting worth, are shining instruments  
In false ambition's hand, to finish faults  
Illustrious, and give infamy renown.*

—Night Thoughts; YOUNG.

*Conceit is just as natural a thing to human  
minds as a centre is to a circle. But little-minded  
people's thoughts move in such small circles that  
five minutes' conversation gives you an arc long  
enough to determine their whole curve. An arc in  
the movement of a large intellect does not sensibly  
differ from a straight line.*

—The Autocrat of the Breakfast-Table; HOLMES.

1904.

SATURDAY.

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MEMORANDA AND DIARY.

## SEPTEMBER 4.

STEPHEN HARRIMAN LONG.

- b. December 30, 1784. d. September 4, 1864.  
American engineer. Engaged in surveying the Baltimore and Ohio Railroad from 1827-'30, and as engineer-in-chief of the Western and Atlantic Railroad in Georgia, 1837-'40, in which capacity he introduced a system of curves in the location of the road and a new kind of truss bridge, which was called by his name, and which was generally adopted in the United States.

*Time wears all his locks before,  
Take them hold upon his forehead;  
When he flies he turns no more,  
And behind his scalp is naked.  
Works adjourned have many stays.  
Long demurs bring new delays.*

—Delays: ROBERT SOUTHWELL.

*Labor achieves grander victories, it weaves more durable trophies, it holds wider sway, than the conqueror. His name becomes tainted and his monuments crumble; but Labor converts his red battlefields into gardens, and erects monuments significant of better things.*

- 1660.—Toll-gates and turnpikes were first set up.  
1836.—John L. Macadam, inventor Macadam roads, Scotland, died, aged 80 years.  
1836.—A steel bridge was constructed by M. Joret at Paris.  
1883, December 20.—The cantilever railroad bridge across Niagara River was opened.

JAMES WYATT.

- b. August 3, 1746. d. September 4, 1813.  
English architect. Studied at Rome and rebuilt the Pantheon, Kew Palace, Fonthill Abbey, various improvements at Windsor, Westminster and Salisbury, and the wings to the Duke of Devonshire's villa at Chiswick. He was buried in Westminster Abbey.

*Ah, pity that Time's hasty wings  
Must sweep thee off with vulgar things!  
Let architects of humbler name  
On frail materials build their fame,  
Their noblest works the world might want,  
Wyatt should build in adamant.*  
—Variety: W. WHITEHEAD.

*Architecture is frozen music.*

—Philosophie der Kunst: SCHILLING.

*A maze of corridors contrived for sin,  
Dark winding stairs, dim galleries got past,  
You gain the inmost chambers, gain at last  
A maple-panell'd room; that haze which seems  
Floating about the panel, if there gleams  
A sunbeam over it, will turn to gold.*

—Sordello: BROWNING.

- 1078.—London. The Tower was begun by William I.  
1097.—London. Westminster Hall was built by William Rufus for banqueting purposes.  
1245.—Peter of Savoy built Savoy Palace, London. He gave it to the fraternity of Mountjoy. Queen Eleanor, his niece, purchased it for her son Edmond.

1904.

SUNDAY.

1904.

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MEMORANDA AND DIARY.

# SEPTEMBER 5.

THOMAS STERRY HUNT.

b. September 5, 1836.

d.

1892.

American scientist. He developed a system of organic chemistry in which all chemical compounds were formed on simple types represented by one or more molecules of water. He was the first to demonstrate the commercial value of deposits of phosphates of lime in Canada as a fertilizer. In 1859 he invented a permanent green ink and gave the name of "greenback" currency to the bills which were printed with it. He has published "Chemical and Geological Essays" (1874) and "Azoic Rocks" (1878).  
*I am the mote in the sunbeam, and I am the burning sun;  
 "Rest here!" I whisper the atom. I call to the orb, "Roll on!"  
 I am the blush of the morning, and I am the evening breeze;  
 I am the leaf's low murmur, the swell of the terrible seas.  
 I am the breath of the flute, I am the wind of man,  
 Gold's glitter, the light of the diamond, and the sea-pearl's  
 luster won.*

*The rose, her poet nightingale, the songs from his throat that  
 rise;  
 Flint sparks, the taper, the moth that about it flies.  
 I am what was, is, will be; creation's ascent and fall;  
 The link, the chain of existence; beginning and end of all.*

—From *Dyaleddu Fumë*, by RITTER.

Ancient black inks were composed of soot and ivory-black. Indian ink was brought from China, and must have been in use by the eastern people from the earliest ages. It was usually brought to Europe in small quadrangular cakes and was composed of a fine black and animal glue.

1723.—First paper money was issued by Pennsylvania.

JOHN DALTON.

b. September 5, 1766.

d. July 27, 1844.

English chemist. It is in connection with the Atomic Theory that his name is so well known. From this theory he deducted the following laws of combination: (1) each compound consists invariably of the same constituents; (2) the elements of every compound unite in definite and constant proportions; (3) when elements combine in more proportions than one, those proportions are multiples, etc. In 1793 he published "Meteorological Essays," and an account of a singular defect in his vision, which is termed "Daltonism," and in 1803 his important theory of "The Constitution of Mixed Gases."

*Small atom, unconsidered,  
 Unfelt, and scarcely seen.*

*I, even I, existed,*

*And played my proper part  
 In God's great plan—oh, little man,  
 Reflect on what thou art!*

*Couldst thou destroy my being,  
 Thy hand might reach the spheres,  
 And bid the sun no longer run  
 His course among his peers.*

*Be humble, brother atom;  
 Whate'er thy mortal growth  
 Or mine may be, humility  
 Alone becomes us both.*

—MACKAY.

1904.

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MEMORANDA AND DIARY.

# SEPTEMBER 6.

ORVILLE WHITMORE CHILDS.

b. December 27, 1802.

d. September 6, 1870.

American engineer. Engaged in the survey and construction of the Champlain Canal improvement in 1824-'25, in building the Oswego Canal in 1826-'28, the survey and plans for the improvement of the Oneida River in 1829-'30 and in the construction of the Chenango Canal in 1833-'36. He was chief engineer and constructed a number of railroads.

*'Tis Labor works the magic press,  
And turns the crank in hives of toil,  
And beckons angels down to bless  
Here sun-drowned toil, with shining spade,  
Links lake to lake with silver ties,  
Strung thick with palaces of trade  
And temples towering to the skies.*  
—An Ode to Labor : GEORGE W. BUNGAY.

*Thus shall the years proceed—till growing time  
Unfold the treasures of each suffering clime ;  
Till one vast brotherhood mankind unite  
In equal bonds of knowledge and of right ;  
Then, the proud colossus, to the smiling skies,  
In simple majesty sublime shall rise,  
O'er ignorance, Faith's, their triumph loud proclaim,  
And bear inscribed, immortal, Darwin's name.*  
(—E. H. SMITH.

1825, October 26.—Great Erie Canal, 363 miles long, was completed, chiefly through influence of Dewitt Clinton. It cost \$7,500,000, and connects Great Lakes with the seaboard of New York. The Champlain Canal was also completed.

ROBERT HUNT.

b. September 6, 1807.

d. October 17, 1887.

English scientist. He is best known by his work on "Photography" (1842), "Researches on Light," "Elementary Physics" (1851) and "Manual of Photography" (1857). He devoted special attention to the chemical influence of the solar rays, was the discoverer of several important photographic processes and contributed largely to our knowledge of the influence of light, heat and actinism on the growth of plants. He was actively engaged in investigating the phenomena of mineral veins and of metalliferous deposits.

*See how yon beam of seeming white  
Is braided out of seven-hued light,  
Yet in those lucid globes no ray  
By any chance shall break astray,  
Hark how the rolling surge of sound,  
Arches and spirals circling round,  
Wakes the hushed spirit through thine ear  
With music it is heaven to hear.*  
—HOLMES.

1821.—Joseph von Fraunhofer invented and first used gratings to measure wave lengths of light.

1822.—The first elements of spectrum analysis were worked out by Sir David Brewster.

1842.—Christian Doppler enunciated his principle of the increase or decrease of wave-number when the body emitting the waves is approaching or receding.



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MEMORANDA AND DIARY.

# SEPTEMBER 7.

STEPHEN HALES.

b. *September 7, 1677.*

*d. January 4, 1761.*  
English physiologist and naturalist. He made important discoveries in vegetable physiology. He wrote treatises on anatomy, the circulation of the blood and invented an improved plan for ventilating prisons. He opened the way to a correct appreciation of blood pressure. His work ranks second in importance to Harvey's in founding the modern science of physiology. His most important book was "Statical Essays."

*We live in deeds, not years; in thoughts, not breaths;  
In feelings, not in figures on a dial.  
We should count time by heart-throbs. He most lives  
Who thinks most; feels the noblest; acts the best.  
And he whose heart beats quickest lives the longest.  
Lives in one hour more than in years do some  
Whose fat blood sleeps as it slips along their veins.  
Life is but a means unto an end; that end,  
Beginning, mean, and end to all things—God.  
The dead have all the glory of the world.*

—The End of Life; P. J. BAILEY.

*The motive of science was the extension of man,  
on all sides, into Nature, till his hands should  
touch the stars, his eyes see through the earth, his  
ears understand the language of beast and bird  
and the sense of the wind; and through his sym-  
pathy heaven and earth should talk with him.*

—Beauty; EMERSON.

AUGUST KEKULÉ.

b. *September 7, 1829.*

*d. July 13, 1896.*  
German chemist. By his conception of benzene as a hexamethine he furnishes the direction for one of the most important branches of chemical research. His most important work was his demonstration of the quadruple character of the atoms of carbon. Frankland's idea of saturation-capacity of elementary atoms was first advanced by him.

*For Nature beats in perfect tune,  
And rounds with rhyme her every rune,  
Whether she work in land or sea,  
Or hide underground her alchemy.*

—Woodnotes; EMERSON.

*And know that every atom of the dust,  
That mingles with the air, had thought and power,  
And pillowed the same hopes on the same fears,  
And toiled and struggled in the waves of woe.*

—Westminster Abbey; SUMNER L. FAIRFIELD.

*When the mighty law that governs the sun in his orbit,  
And that, concealed in the bud, teaches the point  
how to move,*

*When necessity's silent law, the steadfast, the changeless,  
Stirred up billows more free, e'en in the bosom of man—  
When the sense, unwerring, and true as the hand of the dial,  
Pointed only to truth, only to what was eternal?*

—Genius; SCHILLER.

1904.

WEDNESDAY.

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MEMORANDA AND DIARY.

## SEPTEMBER 8.

ARTHUR WILLIAMS WRIGHT.

b. September 8, 1836.

d.

American physicist. In 1870-'71 he first observed and described the electric shadow; in 1872-'74 he devised a new apparatus for the production of ozone and investigated its action on alcohol and ether, and he determined the polarization of the zodiacal light, measuring its amount and investigating its spectrum. He first discovered gases in stony meteorites, extracted them and determined their composition, obtaining their spectra in vacuum tubes and pointed out their relation to the spectra of comets, thus affording a probable explanation of the latter. In 1877 he discharged electricity in a vacuum and deposited the metal of the electrode upon glass and other surfaces, thus forming brilliant, transparent, metallic films. He devised a barometer and an apparatus for distilling mercury in vacuo, which was adopted by the United States Signal Service.

*No ray is dimmed, no atom worn,*

*My oldest force is good as new,*

*And the fresh rose on yonder thorn*

*Gives back the bending heavens in dew.*

—Song of Nature: EMERSON.

*This vast and solid earth, that blazing sun,*

*Those skies, thro' which it rolls, must all have end.*

*What then is man? the smallest part of nothing.*

—Young's *Revenge*.

VICTOR MEYER.

b. September 8, 1848.

d. August 8, 1897.

German chemist. Discovered thiophene and with Kries discovered thiotolen. His researches upon nitro-compounds of the fatty series, upon iso-nitroso compounds and upon thiophene have greatly contributed to the knowledge of organic chemistry. The method devised by him for vapor-density determinations has become a standard one. Among his most recent researches were those on the iodo- and iodoso-compounds and on the laws governing the esterification of aromatic acids. In 1872 he discovered nitro-ethane.

*Each beast, each insect, happy in its own,*

*Is heaven unkind to man, and man alone?*

*Shall he alone whom rational we call,*

*Be pleased with nothing, if not blessed with all?*

*This bliss of man (could pride that blessing find),*

*Is not to act or think beyond mankind;*

*No powers of body or of soul to share,*

*But what his nature and his state can bear.*

—POPE.

1848-50.—By the heat of oxy-hydrogen flame Wm. Robert Grove decomposed water into oxygen and hydrogen gases.

1847.—Nitroglycerine, or glonoin oil, was discovered by Ascarne Sobrero.

1860.—Grless discovered the diazo-compounds.

1872-80.—Frederick A. Genth established the identity of twenty-three new minerals.

1904.

THURSDAY.

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MEMORANDA AND DIARY.

## SEPTEMBER 9.

ALOISIO, OR LUTGI, GALVANI.

b. *September 9, 1737.* d. *February 5, 1798.*

Italian discoverer of galvanism; discovered animal electricity about 1790. In his experiments in electricity he mistook the effect for the cause and so missed the true phenomena that two different metals immersed in a solution would create an electric current.

*So bold, great actions, that are seen too near,  
Look rash and foolish to unthinking eyes;  
They need the past for distance to appear  
In their true grandeur. Let us yet be wise,  
And not too soon our neighbor's deed malign,  
For what seems coarse is often good and fine.*

—The Statue.

*Believe in the new age, in the better day. Be  
hospitable to new thoughts, to new truths. Be alert  
to use scientific methods and quick to utilize the  
best gifts to civilization. Be twentieth-century men.  
Believe in liberty. Trust your fellow-man.*

—JOHN HOPKINS.

1720-36.—Electrical phenomena were discovered by Wheeler and Stephen Gray. They discovered that the human body is a conductor of electricity and that electricity acts at a distance.

1752.—Lightning conductors were set up for the protection of buildings by Benjamin Franklin.

1825.—Leopoldo Nobili demonstrated animal electricity.

1841.—Du Bois-Reymond began his original experiments in animal electricity, published in 1848.

AUGUSTIN PYRAMUS DE CANDOLLE.

b. *February 4, 1778.* d. *September 9, 1841.*

Swiss botanist. In his "Elementary Theory of Botany" (1813) he developed a new classification of plants according to the natural system. He developed the doctrine of metamorphosis in his "Vegetable Organography" (1827). He occupied the highest rank among the botanists of the nineteenth century, and was a friend of Cuvier, Humboldt and Lamarck.

*See him from nature rising slow to art!  
To copy instinct there was reason's part;  
Thus then to man the voice of nature spoke—  
Go, from the creatures thy instruction take;  
Learn from the birds what food the thickets yield;  
Learn from the beasts the physics of the field;  
Thy arts of building from the bee receive;  
Learn of the mole to plow, the worm to weave;  
Learn of the little Nautilus to sail,  
Spread the thin oar, and catch the driving gale.*

—Essay on Man; POPE.

*Shakespeare, Homer, Dante, Chaucer, saw the  
splendor of meaning that plays over the visible  
world. Knew that a tree had another use than for  
apples, and corn another than for meal, and the  
bull of the earth than for tillage and roads; that  
these things bore a second and finer harvest to the  
mind, being emblems of its thoughts, and convey-  
ing in all their natural history a certain mute  
commentary on human life.*

Representative Men; EMERSON.

1904.

FRIDAY.

1904.

MEMORANDA AND DIARY.

## SEPTEMBER 10.

JOHN ADAMS WHIPPLE.

b. September 10, 1822.

d.

American inventor. He was the first to manufacture the chemicals used in the daguerreotype process in this country. In connection with photography he made many useful inventions and improvements. He prepared his plates and brought out his pictures by steam, invented crayon daguerreotypes and crystalotypes (daguerreotypes on glass), and on July 17, 1850, he photographed Alpha Lyra, which is said to have been the first successful experiment in stellar photography.

*The wise and active conquer difficulties  
By daring to attempt them; sloth and folly  
Shiver and shrink at the sight of toil and hazard,  
And make the impossibilities they fear.*

—ROWE.

*Each in its orbit through unmeasured space,  
Sweeps round the central sun in tireless race.  
Say, ye great orbs, have you your land and seas,  
Your ever-flowing streams, your forest trees?  
Have you your mountains high and valleys wide,  
Where your peaceful denizens reside?  
Have you true men, who know the wrong and right,  
And, knowing, walk in truth, in love and right?*

1839, June.—An account of the invention by which images were fixed on a plate by gilding it was published. Daguerre, in 1834, discovered photography on paper; he made experiments on metal plates, and in 1835 discovered that a silver plate was made sensitive to light by exposing it to iodine vapors.

JACQUES BOUCHER DE PERTHES.

b. September 10, 1788.

d. August 10, 1868.

French archæologist. He has been called the founder of the science of archæo-geology. His reputation is founded chiefly on his work called "La Creation" (1839-1841) and his "Celtic and Antediluvian Antiquities" (1847).

*Forward, backward, backward, forward, in the immeasurable  
sea,  
Sway'd by vaster eddies and flows that can be known to you or  
me.*

*All the suns—are these but symbols of innumerable man,  
Man or mind that sees a shadow of the planner in the plan?*

*Evolution ever climbing after some ideal good,  
And Reversion ever dragging Evolution in the mud.*

*Many an Eon moulded earth before her highest man was  
born,  
Many an Eon, too, may pass when earth is mantles and for-  
lorn.*

—TENNYSON.

1799.—The famous Rosetta stone was discovered containing a decree of the Egyptian Priests in favor of Ptolemy V. (305-181 B. C.), being written in three languages, one of which was ancient Egyptian. It afforded the key by which hieroglyphics were deciphered.

1822.—Jean Francois Champollion discovered the alphabetic characters of ancient Egyptian and read names of persons and places.

1856.—Emmanuel de Rouge translated Egyptian text, including a poem describing the exploits of Ramees II. in his war with the Hittites.



1904.

SATURDAY.

1904.

MEMORANDA AND DIARY.

# SEPTEMBER 11.

RUDOLF JAKOB CAMERARIUS.

*b. February 12, 1665. d. September 11, 1721.*

German physician and botanist. He was the first to expound the theory of *sex* in plants (1694). He was professor of medicine and director of the Botanic Garden at Tübingen.

*The aloe hears for years the autumn's dirges,*

*Before it shows its blossoms to the skies ;*

*The coral reef that braves the ocean's surges*

*Through centuries of growth alone can rise.*

*Thus, through her works, Dame Nature offers ever,*

*For our acceptance, one persistent thought.*

*'Tis but by patient, sturdy, brave endeavor,*

*The greatest, best, and grandest things are wrought.*

—PERSEVERANCE : BETH DAY.

*Go mark the matchless workings of the power*

*That shuts within the seed the future flower ;*

*Bids these in elegance of form excel,*

*In colours these, and those delight the smell ;*

*Sends Nature forth, the daughter of the skies,*

*To dance on earth, and charm all human eyes.*

—COWPER.

*Say, what impels, amid surrounding snow*

*Congealed, the Crocus, flamey bud to grow ?*

*Say, what retards, amid the summer's blaze,*

*The autumnal bulb, till pale declining days ?*

*The God of Seasons, whose pervading power*

*Controls the Sun, or sheds the fleecy shower ;*

*He bids each flower his quickening word obey,*

*Or to each lingering bloom enjoins delay.*

—HENRY KIRKE WHITE.

MARCUS VITRUVIUS POLLIO.

*b. 80-76 B. C.*

*d. about 10 B. C.*

Born at Formia, in Campania. He flourished under Julius Cæsar and Cæsar Augustus and lived to an advanced age. He is called the "Father of Architecture." He wrote an able work, in ten books, on architecture, and his treatise is still the text book for the study of the architecture of Greece and Rome. There is scarcely an ancient writer of equal eminence of whom so little is recorded. Without his works the remains of Roman buildings would have been extremely difficult to understand. Vitruvius' works are dedicated to Cæsar Augustus. Newton translated them and made observations on his life. He was in Africa with Julius Cæsar 46 B. C. and wrote, between 20 B. C. and 11 B. C., his work, *Basilica at Farnum*.

*Here and there appears,*

*As if to show Ruin's handiwork, not ours,*

*An idle column, a half buried arch,*

*A wall of some great temple. Here was once*

*The Forum, whence a mandate, eagle-winged,*

*Went to the ends of the earth,*

*The very dust we tread stirs as with life,*

*And not the slightest breath that sends not up*

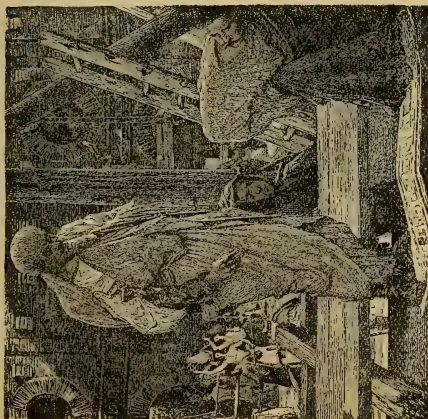
*Something of human grandeur. We are come—*

*And now—where once the mightiest spirits met*

*In terrible conflict—this, while Rome was free,*

*The noblest theatre on this side of heaven.*

—ROGERS.





1904.

SUNDAY.

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MEMORANDA AND DIARY.

## SEPTEMBER 12.

RICHARD JORDAN GATLING.

b. *September 12, 1818.* d. *February 26, 1903.*

American inventor of a machine for sowing rice, which he adapted to sowing wheat in drills. In 1850 he invented a machine for breaking hemp and in 1857 a steam plow. In 1861 he conceived the idea of his revolving rapid-fire battery-gun.

*Our country calls ; away ! away !*

*To where the blood-stream blots the green.*

*Strike to defend the gentlest way*

*That Time in all his course has seen.*

*See, from a thousand coverts—see,*

*Spring the armed foes that haunt her track ;*

*They rush to smite her down, and we*

*Must beat the banded traitors back.* —BRYANT.

*Swift hurried from the bastion, 'mid volumes of smoke,*

*I dash a grim messenger flying ;*

*Before me the living—behind me—alas !*

*There are wounded men gasping and dying.*

*I carry dispatches, written in blood,*

*With a death-wound I seal and deliver.*

*Is it strange that a destiny fearful as this*

*Makes the song of the cannon-ball quiver ?—*

*Whistling so wearily, sighing so airily,*

*Hymning so dreamily a dirge for the dead !*

—*Song of the Cannon-Ball* : ANON.

1695.—Rice was first planted at Sullivan's Island, S. C. The seed was given by a captain of a vessel that stopped there en route to Great Britain.

1862.—Gatling guns were first made.

RICHARD MARCH HOE.

b. *September 12, 1812.* d. *June 7, 1886.*

American inventor. Made many improvements in the printing press. In 1837 he obtained a patent for a process of grinding saws.

*The liberty of the press is the highest safeguard to all free government. Ours could not exist without it. It is like a great, exulting and abounding river. It is fed by the dews of heaven, which distill their sweetest drops to form it. It gushes from the rill, as it breaks from the deep caverns of the earth. It is augmented by a thousand affluents that dash from the mountain top to separate again into a thousand bounteous and irrigating streams around.*

—*Liberty of the Press* : COL. E. D. BAKER.

1591.—The first patent was granted for printing.

1622.—Governor of Virginia forbade the use of printing presses.

1785.—A cylindrical printing-machine was invented by Christoph P. Oberkampff.

1800.—The Stanhope printing-press was invented.

1803.—A steam-press for printing was invented by König and Bauer.

1811.—A steam printing-machine was invented by Friedrich König, a German.

1836.—Anastatic printing was invented by Cocks, of Falmouth.

1847.—A rotary press was made by R. Hoe & Co.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

# SEPTEMBER 13.

WILLIAM H. HORSTMAN.

b.

German-American. Inventor and manufacturer of trimmings of various kinds. In 1824 he introduced into the United States from Germany the use of plaiting or braiding machines and about the same time he first introduced into the United States the Jacquard loom, for weaving patterns in textile fabrics.

-d.

JAMES LYALL.

d.

b. September 13, 1836.

Scotch inventor. In 1863 he invented a simple mixture for enameling cloth which led to large contracts for the manufacture of knapsacks and haversacks. In 1868 he invented the Lyall positive-motion loom, which has since been adopted by the largest mills in the United States, Europe, China and Japan.

*The threads our hands in blindness spin  
No self-determined plan weaves in;  
The shuttle of the unseen powers  
Works out a pattern not as ours.*

—Overruled; EMERSON.

*And lo! the workman at the loom was Time  
Weaving the web of life,  
Twas parti-colored, wrought of Peace and Strife;  
And through the warp thereof  
Shot little golden threads of Joy and Love.  
And one stood by whose eyes were brimmed with tears  
Praising the mighty shears  
Wherewith, when seemed the weaver's will at ebb,  
He cut the wondrous web.*

—CLINTON SCOLLARD.

*Labor gathers the gossamer web of the caterpillar, the cotton from the field and fleece from the flock, and weaves them into raiments soft, and warm and beautiful—the purple robe of the prince and the gray gown of the peasant being alike its handiwork.*

REV. NEWMAN HALL.

*Weaver at his loom is sitting,  
Throws his shuttle to and fro;  
Mid the noise and wild confusion,  
Well the weaver seems to know,  
As he makes his shuttle go,  
What each motion, and confusion,  
In the grand result will show:  
Weaving daily, singing gayly,  
As he makes his busy shuttle,  
Hither, thither, scud and scuttle.*

—The Mystic Weaver: REV. DR. HARBAUGH.

The origin of the art of enameling is doubtful. It was practiced by the Egyptians and other early nations and was known in England in the times of the Saxons.

1619.—The art of making tapestry was introduced by William Sheldon, and established at Mortlake by Sir Francis Crane. 1667.—Gobelin tapestry manufactory was established in Paris.

1839.—First power looms in the world for making carpets were set up at Lowell, Mass.



1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

## SEPTEMBER 14.

CHARLES FRANÇOIS DE CISTERNAY DUFAY.

b. *September 14, 1698.*

d. *July 16, 1739.*

French scientist. He originated the theory of two kinds of electricity, vitreous and resinous. He made improvements in barometers and in pumps for extinguishing fires.

*Look! Look! that livid flash!*

*And instantly follows the rattling thunder,*

*As if some cloud-crag, split asunder,*

*Fell, splintering with a ruinous crash*

*On the earth, which crouches in silence under.*

—LOWELL.

*Nymphs! your fine hands ethereal floods amass*

*From the warm cushion, and the whirling glass;*

*Beard the bright cylinder with golden wire,*

*And circumsfuse the gravitating fire.*

*Cold from each point cerulean lustres gleam,*

*Or shoot in air the scintillating stream.*

*So, borne on brazen talons, watch'd of old*

*The sleepless dragon o'er his fruits of gold;*

*Bright beam'd at his scales, his eye-balls blazed with ire,*

*And his wide nostrils breathed enchanted fire.*

—Botanic Garden; DR. DARWIN.

1810-1877.—Alexander Bain lived. He was a clockmaker, and devised a method by which many clocks worked electrically from one standard time-keeper. He was the pioneer of modern high-speed telegraphy. He claimed the invention of the first printing telegraph, and he invented the chemical telegraph in 1843. He discovered independently the use of the earth circuit though it was anticipated by Steinheil.

GEORGE LOUIS LE SAGE.

b. 1724.

d.

1803.

Swiss philosopher. In 1774 he attempted to apply frictional electricity to telegraphy. He published an "Essay on Mechanical Chemistry" (1758), a treatise, "Newtonian Lucretius" (1782) and "Fragments on Final Causes."

*You bid gold-leaves, in crystal lanterns held,*

*Approach attracted, and recede repell'd;*

*While paper-nymphs in instinct with motion rise,*

*And dancing fauns the admiring Sage surprise.*

*Or, if on wax some fearless Beauty stand,*

*And touch the sparkling rod with graceful hand;*

*Through her fine limbs the mimic lightnings dart,*

*And flames innocuous eddy round her heart:*

*O'er her fair brow the kindling lustres glare,*

*Blue rays diverging from her bristling hair;*

*While some fond youth the kiss ethereal sips,*

*And soft fires issue from their meeting lips,*

*So round the virgin Saint in silver streams*

*The holy Halo shoots its arrowy beams.*

—Botanic Garden; DR. DARWIN.

*Even the lightning-elf, who rives the oak*

*And bars the tempest, shall bow to that yoke,*

*And be its messenger to run.*

—Supple's *Danpierre's Dream*.

1832.—Schweigger applied a coil of insulated wire to increase the magnetic power of an electric current. He is regarded as the original inventor of the needle telegraph and the recording electric telegraphs.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## SEPTEMBER 15.

ZACHARIAH ALLEN.

- b. *September 15, 1795.* d. *March 17, 1882.*  
 American inventor. He was the inventor of the automatic cut-off valve for the steam-engine, extension rollers, an improved fire-engine and a hot-air furnace. He devised a storage reservoir for water-power and first suggested the system of mutual insurance adopted by New England mill-owners. In 1823 he engaged in manufacturing. He published a treatise on "Practical Mechanics," "Philosophy of the Mechanics of Nature" (1851) and "Solar Light and Heat" (1879).

*All life is labour, only death is rest ;  
 The mountain drains the torrent from the breast  
 Of clouds full pastured where the tropic reef  
 Is ocean-foamed, and pours along its fief  
 Of purple plain, wide flowing rivers prest  
 With clover-banks and slopes of waving corn ;  
 Th' unwearied sun keeps evermore his round  
 Among the siren stars, as on the morn  
 He first rose up amid the blue profound.  
 Of God's almighty will and labour born.*

—Labour ; D. F.

1720 (about).—A small boy of the name of Potter, whose duty it was to turn the cocks to operate the steam pumps made the first automatic cut-off of a steam-engine. By an ingenious arrangement of cords to the levers, he made them self acting or automatic, so that he could join his companions at play, unknown to his master. Brighton substituted rods for the cords.

1886.—The manufacture of automobiles became an important industry, although they were invented in 1896.

JOSEPH CUGNOT.

- b. 1725. d. 1804.

French engineer and reputed inventor of the automobile. In 1770 he constructed a steam automobile for artillery transport and in 1771 he made one which was examined by Bonaparte in 1793.

*Carriages without horses shall go,  
 And accidents fit the world with woe.  
 Around the world thoughts shall fly  
 In the twinkling of an eye.  
 Water shall yet more wonders do ;  
 Now strange, yet shall be true.  
 Through hills men shall ride,  
 And no horse or ass be at his side.  
 Under water men shall walk.  
 Shall ride, shall sleep, shall talk.  
 In the air men shall be seen,  
 In white, in black, in green.  
 Iron in the water shall float,  
 As easy as a wooden boat.  
 Fire and water shall wonders do,  
 England shall at last admit a Jew  
 The world to an end shall come,  
 In eighteen hundred and eighty-one.*

—Mother Shipton's Prophecy (1488) and (1641).

1784.—Murdoch made the first application of steam to the propulsion of carriages. He was in the employ of Messrs. Boulton and Watt.

1784.—Murdoch first built the oscillate cylinder and applied it to a model steam carriage.

1807.—De Rivaz patented a locomotive carriage, driven by an explosive engine using a mixture of hydrogen and common air, ignited by the electric spark.

1904.

THURSDAY,

1904.

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MEMORANDA AND DIARY.

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## SEPTEMBER 16.

GEORGE BARTLETT PRESCOTT.

b. *September 16, 1830.*

d.

American electrician. In 1876 he introduced in New York the system of transmitting messages by pneumatic tubes; in 1870 he introduced the duplex and in 1874 the quadruplex telegraphs. His inventions include improvements in telegraph insulators (1872) and an improvement in quadruplex telegraphs (1876). He has published "History, Theory and Practice of the Electric Telegraph" (1860) and "The Proposed Union of the Telegraph and Postal Systems" (1869).

*Last Michel's hands, with touch of potent charm,  
The polish'd rods with powers magnetic arm;  
With points directed to the polar stars,  
In one long line extend the temper'd bars;  
Then thrice and thrice with steady eye he guides,  
And o'er the adhesive train the magnet slides;  
The obedient Steel with living instinct moves,  
And veers forever to the pole it loves.*

— *Botanic Garden*; DR. DARWIN.

1861.—Fred Stark Pearson was born. He established the electric system for the West End Street Railway, Boston, Mass. The large belted machines, as well as the direct-connected units, were to meet his requirements from the manufacturers. The Columbus Avenue and Lexington Avenue cable roads of New York were constructed under his supervision; also the system of underground conduit construction in use in the City of New York.

JAMES J. HILL.

b. *September 16, 1838.*

d.

Built the Great Northern and other Western railroads. He established the Red River Transportation Company (1875); organized, 1873, a syndicate which secured control of St. Paul & Pacific Railroad from the Dutch owners of the securities; reorganized the system as the St. Paul, Minneapolis & Manitoba Railroad and is now president of it.

*From ocean to ocean the rail  
Runs o'er the mountain and vale,  
Which echo with blows on the nail,  
Now heard by the list'ning races.  
Hail to the pathway of nations here!  
It runs to-day through a hemisphere,  
The good time coming must now be near,  
Hail to the age of steam!  
Hail to the iron team!  
Hail to our iron bars!  
Hail to our flag of stars!*

— *Rivet the Last Pacific Rail*;  
GEORGE W. BUNGAY.

1886, July.—First railroad in Canada was opened.

1886, November 12.—Grand Trunk Railway, 850 miles long, was opened from Quebec to Toronto.

1883, September 8.—Northern Pacific Railroad of 2,500 miles was opened.

1893, January 5.—Last spike on Great Northern Railroad was driven at a point of the road in the Cascade Mountains.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## SEPTEMBER 17.

JAMES RICHARDS HASKELL.

b. *September 17, 1825.*

d.

American inventor. In 1854 he began experiments with steel breech-loading rifled cannon and breech-loading small-arms, manufacturing twenty-five of the former, which were purchased by the Mexican Government. In 1855 he experimented with multi-charge guns with Azel S. Lyman, who first conceived the idea of applying successive charges of powder to accelerate the velocity of a projectile. In 1862, with Rafael, he invented and constructed a rapid-firing machine gun.

*Lay down the axe ; fling by the spade ;  
Leave in its track the toiling plow ;  
The rifle and the bayonet blade  
For arms like yours were fitter now ;  
And let the hands that ply the pen  
Quit the light task, and learn to wield  
The horseman's crooked brand, and rein  
The charger on the battle-field.  
Ho ! sturdy as the oaks ye cleave,  
And moved as soon to fear and flight,  
Men of the glade and forest ; leave  
Your woodcraft for the field of fight.  
The arms that wield the axe must pour  
An iron tempest on the foe ;  
His servile ranks shall reel before  
The arm that lays the panther low.*

—Our Country's Call : BRYANT.

1885, August 19.—Daguerre published his photographic process.

FOX TALBOT.

b. *February 1800.*

d. *September 17, 1877.*

English photographer and printer. In 1840 he invented the Calotype process, by which the images of the camera were fixed on paper. His patent was sealed on February 8, 1841. Talbot's specification claimed the use of gallic acid and he succeeded in enforcing his claim in a court of law, though on the 10th day of April, 1839, photographs of objects taken in the solar microscope by Rev. J. B. Reade were shown at the London Institution, which were described to have been produced by an infusion of galls and fixed with hyposulphite of soda. Talbot was also the first to fix images on steel (1855).

*We have a pretty artillery of tools now in our  
social arrangements ; We ride four times as fast as  
our fathers did ; travel, grind, weave, forge, plant,  
fill, and excavate better. . . . We have the  
calculus ; we have the newspaper, which does its  
best to make every square acre of land and sea give  
an account of itself at your breakfast-table ; we  
have money, and paper money ; we have language,  
the finest tool of all and nearest to the mind.*

—Works and Days : EMERSON.

1800.—Josiah Wedgwood, the porcelain manufacturer, undertook a series of experiments to fix the images of the camera. He was assisted by Sir Humphrey Davy. In 1802 photographs were first produced in England by them.

1827.—Niepce obtained camera images.



1904.

SATURDAY.

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MEMORANDA AND DIARY.

## SEPTEMBER 18.

WILLIAM CHARLES WELLS.

*b. May* , 1757. *d. September 18, 1817.*

American scientist. He wrote a celebrated "Essay on Dew and Several Appearances Connected with it" (1814). This was the first comprehensive theory of dew, and its conclusions are accepted today with slight modifications. His experimental work on this subject was remarkable for patient research, close reasoning and the simplicity of the means that he employed. He was the first to show the relation of radiation to the deposition of dew.

*Nothing is lost ; the drop of dew  
Which trembles on the leaf or flower,  
Is but exhaled to fall anew  
In summer's thunder-shower ;  
Perchance to shine within the bow  
That fronts the sun at fall of day,  
Perchance to sparkle in the flow  
Of fountains far away.*

*The wisest man could ask no more of Fate  
Than to be simple, modest, manly, true,  
Safe from the Many, honored by the Few ;  
To count as naught in World, or Church, or State,  
But inwardly in secret to be great ;  
To feel mysterious Nature ever new ;  
To touch, if not to grasp, her endless view,  
And learn by each discovery how to wait.*

—JEFFRIES WYMAN.

LEON FOUCAULT.

*b. September 18, 1819. d. February 11, 1868.*

French inventor and natural philosopher. In 1844 he invented an apparatus by which electric light was used in optical experiments, microscopic researches, etc. He improved photography and the theory of light and proved that the velocity of light was not the same in a vacuum as in the air. He attracted attention by his demonstration of the rotary motion of the earth by the pendulum and gyroscope. Foucault was the first to utilize plane mirrors in his "siderostat," in which such a mirror is made to move in front of a horizontal fixed telescope, which may be of any focal length, and no expensive dome or rising floor is required.

*I have always found it in mine own experience an easier matter to devise many and profitable inventions, than to dispose of one of them to the good of the author himself.*

—SIR HUGH PLATT.

*Too often the real worker and discoverer remain unknown, and an invention, beautiful but useless in one age or country, can be applied only in a remote generation or in a distant land. Mankind hangs together from generation to generation ; easy labor is but an inherited skill ; great discoveries and inventions are worked up to by the efforts of myriads ere the goal is reached.*

—H. M. HYNDMAN.

1904.

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MEMORANDA AND DIARY.

## SEPTEMBER 19.

PETER VAN MUSSCHENBROEK.

b. *March* 14, 1692. d. *September* 19, 1761.

Dutch scientist. He devoted himself to experimental physics in which he made important discoveries, especially in magnetism and the cohesion of bodies. He is the discoverer of transpiration and exhalation of plants. Among his works are "Physics Experimentales et Geometrical Dissertationes" (1729) and "Elementa Physicæ, or Introduction to Natural Philosophy" (1734).

*Within the infant rind of this small flower,  
Poison hath residence and medicine power;  
Oh, mickle is the powerful grace that lies  
In herbs, plants, stones, and their true qualities;  
For naught so vile that of the earth doth live,  
But to the earth some special good doth give;  
For naught so good that straining from that fair use  
Revolts from true birth stumbling on abuse.*

*Intellect and industry are never incompatible.  
There is more wisdom, and will be more benefit, in  
combining them than scholars like to believe, or  
than the common world imagine. Life has time  
enough for both, and its happiness will be increased  
by the union.*

1627, November 29—1705, January 17.—John Ray lived. In 1692 he published his first independent, systematic work on plants, the "Methodus Plantarum Nova," in which he showed the true nature of buds and indicated many of the natural orders now employed by botanists. This was practically the first step towards a natural system of classification. He left a complete classification of insects and a less complete "history" of the whole. He is called the Father of Natural History.

OLAUS ROEMER.

b. *September* 25, 1644. d. *September* 19, 1710.

Danish astronomer. In 1675 he made the discovery of the velocity of light by observations of the eclipses of Jupiter's satellites. He first applied the epicycloidal curve in the formation of the teeth of wheels. He is the reputed inventor of the transit instrument, 1692.

*The world material, lately seen in shades,  
And, in those shades, by fragments only seen,  
And seen those fragments by the lab'ring eye,  
Unbroken, now illustrious, and entire,  
Its ample sphere, its universal frame,  
In full dimensions, swells to the survey;  
And enters, at one glance, the ravish'd sight.*

—*Night Thoughts*; YOUNG.

*To Him who tracks the Comet's pathless ways;  
Who to the Stars has their bright courses given,  
And to the Sun appoints his place in heaven;  
And rears for Man a mansion more sublime,—  
Not built with hands, nor doomed to stoop to Time;  
Whose strong foundations, unimpaired shall stay,  
When Suns, and Stars, and Worlds, and all things pass away.*

—*The Comet*; HENRY NEELE.

1761.—The sun's distance was first measured by the transit of Venus. Joseph Delisle's method was introduced.

1846, September 23.—Galle, at the suggestion of Leverrier, discovered Uranus, where indicated by the latter.

126 A. D., January.—According to Leverrier, a cosmical nebulous cloud entered our system and passed so near the planet Uranus as to be brought by its attraction into an elliptic orbit round the sun.

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MEMORANDA AND DIARY.

## SEPTEMBER 20.

JAMES DEWAR.

*b. September 20, 1842. d.*

Scottish scientist and chemist. Author of papers on organic and physical chemistry. He has given demonstrations on the formation of liquid oxygen and air and the production of temperatures approaching—that of the absolute zero, and has been engaged in experimental researches at low temperatures. With Sir F. Abel, he invented smokeless powders and cordite, and together they have succeeded in liquefying fluorine. He effected the liquefaction of hydrogen on May 14, 1898.

*There is a higher chemistry—to hold  
The loves and sighs of youth of wondrous price,  
To fuse them in the pointed, solving flame  
Of after wisdom—each component part  
To separate by nice analysis,  
And thus to find the elemental truths  
That make life's combinations beautiful—  
To melt, and then to cool them all again  
In other crystal harmonies of thought.*

—*Love's Alchemy*; H. W. PARKER.

1936.—Sulphureous carbon was produced by Lampadins.

1920-40.—Gunpowder was invented (?) by Bertholdus or Michael Schwartz, a Cordelier monk of Goslar, Brunswick (but many authorities maintain that it was known long before in various parts of the world).

1800.—The invention of percussion priming by the Rev. A. J. Forsyth was an important step in the perfection of firearms generally and of revolvers particularly.

JOSEPH HARRISON.

*b. September 20, 1810. d. March 27, 1874.*

American engineer. In 1840 he designed for the Reading Railroad an eleven-ton engine; in 1843 he, with Andrew M. Eastwick and Thomas Winans, concluded a contract with Russia to build the locomotives and rolling stock for the St. Petersburg & Moscow Railway. He designed and patented the "Harrison Safety Boiler."

*As the weaver plied the shuttle, wove he too the mystic rhyme,  
And the smith his iron measures hammer'd to the anvil's chime;  
Thanking God, whose boundless wisdom makes the flowers of  
poesy bloom*

*In the forge's dust and cinders, in the tissues of the loom.  
Gathering from the pavement's crevice, as a floweret of the soil,  
The nobility of labour—the long pedigree of toil.*

—Nuremberg: LONGFELLOW.

1835, December 7.—The first railway in Germany was opened between Nuremberg and Furth, Bavaria. It was worked by horses.

1851, September 1.—St. Petersburg and Moscow Railway was opened.

1855.—The Calcutta-India Railway was opened.

1870, March.—The railway between Calcutta and Bombay was completed.

1871, February 16.—Indian State Railway was opened. It extends from Budnaira, a station of Great Indian Peninsula Railway, to Omrauta in Central India.

1899.—Trans-Siberian railway half completed.

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## SEPTEMBER 21.

MORITZ HERMANN JACOBI.

*b. September 21, 1801. d. March 10, 1874.*

German savant. In 1830 he constructed a short electric telegraph in St. Petersburg and in 1832 made the important discovery that the earth could be used to complete the electric circuit. In 1837, simultaneously with Thomas Spencer, he invented the process of electrolytizing. In 1840 he published "Die Galvanoplastik."

*Learning is*

*A bunch of grapes sprung up among the thorns,  
Where, but by caution, none the harm can miss;  
Nor art's true riches read to understand,  
But shall, to please his taste, offend his hand.*

—*Human Learning*: LORD BROOKE.

1844, May 24.—First telegram was sent from Baltimore to Washington.

1851, November 13.—An electric telegraph was opened between France and England.

1861, December 17.—Arthur Edwin Kennelly was born. About 1881 he discovered the law of fault resistance which is so much employed in cable testing. He designed the differential dynamometer-wattmeter; a static voltmeter, and an ammeter. He is the author of "Practical Notes for Electrical Students" and "The Theoretical Elements of Electro-Dynamic Machinery."

1887.—Arrangements were made for transmitting telegraphic messages from railway trains in motion without contact with the ordinary wires.

LOUIS PAUL CALLETEL.

*b. September 21, 1842. d.*

French physicist and inventor. He made researches into the workings of blast furnaces and the problems of combustion and of metallurgy. In 1876 he investigated the compression and liquefaction of gases and in 1877-'78 he liquefied oxygen and other "permanent gases." He, almost by accident, came upon a method which enabled him to liquefy gases by lowering their temperature below the critical point.

*Oh, colder than the wind that freezes  
Founts, that but now in sunshine play'd,  
Is that concealing pang which seizes  
The trusting bosom, when betray'd.*  
—*Lalla Rookh*: MOORE.

*Freeze, Freeze, thou bitter sky,  
That dost not bite so nigh  
As benefits forgot;  
Though thou the waters warn,  
Thy sting is not so sharp  
As friend remembered not.*  
—*As You Like It*: SHAKESPEARE.

1783.—Walker produced ice in summer by means of chemical mixtures.

1845-1888.—Sigmund Von Wroblewski lived and investigated the liquefaction of gases. In 1884 he predicted that liquid air would be the refrigerant of the future. As early as 1885 he pointed out the methods to be employed in the future for refrigeration.



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## SEPTEMBER 22.

JEAN ETIENNE GUETTARD.

- b. *September 22, 1715.* d. *January 7, 1786.*  
 French naturalist. Student of Reaumur. He first ascertained the volcanic nature of the mountains of Auvergne and determined the true character of organic remains. He wrote "Memoirs on Some Mountains of France formerly Volcanoes" (1752) and a treatise "On the Granites of France Compared with Those of Egypt" (1755).

*Nature has reserved mountains as the machinery for putting forth her sublimest spectacles. Her most imposing mysteries are accomplished among the mows and storms that envelop their summits, while the central fires that burn beneath their roots have been contemplated in all time as the most terrific manifestations of his power. As we mount these ancient piles, majestic solitudes, a purer air, fresher vegetation, flowers of more brilliant hues, the enlargement of the horizon, the expansion of mind, and thoughts more serene and meditative seem to whisper us that, in climbing the domes of the temple of nature, we are approaching the throne of the Eternal Being who fills nature with his presence.*  
 —Volcanoes: FLINT.

227 B. C. (about)—An earthquake occurred at Rhodes. The colossus was thrown down.

1774.—Nevis Maskelyne measured the earth's density by the Schiehallion experiments.

1785.—Sir James Hall experimented on melted rocks.

1893, March 9.—Earthquake shock felt distinctly at New York at 12.30 A. M.

JEAN BAPTISTE ELIE DE BEAUMONT.

- b. *September 25, 1798.* d. *September 22, 1874.*

French geologist. He co-operated in a great geological map of France. In 1832 he became professor of geology in the College of France; in 1833 chief engineer of mines. Some of his works are a "Glance at Mines" (1824), "Researches in Some of the Revolutions of the Surface of the Globe" (1829) and "Lectures on Geology" (1845).

*Geology, in the magnitude and sublimity of the objects of which it treats, undoubtedly ranks next to astronomy in the scale of the sciences.*

—SIR J. E. W. HERSHEY.

*Earth so huge and yet so bounded—pools of salt and plots of land—  
 Shallow skin of green azure—chains of mountains, grains of sand!*  
 —TENNYSON.

*Hence sable Coal his massy couch extends,*

*And stars of gold his sparkling Pyrite blends;*

*Hence dail-eyed Naphtha pours his pitchy streams,*

*And Jet uncolour'd drinks the solar beams;*

*Bright Amber shines on his electric throne,*

*And adds ethereal tustres to his own.*

—Botanic Garden: DR. DARWIN.

1787, September 5—1852, December 10.—François Sulpice Boudant lived. In 1815 he studied the minerals of Hungary. He published "Researches on the Causes which Determine Variations of Crystalline Forms of the same Mineral Substance" (1818) and an "Elementary Treatise on Mineralogy" (2d ed. 1831).

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## SEPTEMBER 23.

MICHAEL FARADAY.

*b. September 23, 1791. d. August 25, 1867.*  
English chemist, electrician and philosopher. His first notable discovery was the production of the continuous rotation of magnets and of wires conducting the electric current round each other. In 1831 he discovered induction, the key to the modern development of electricity and the fundamental principle of the future dynamo electric machine. In 1834 he discovered that the decomposition effected by the voltaic current indicate the quantity in weight by which the elements combine, or the weights of the atoms of the atomic theory. He invented his famous conception of the lines of magnetic force and his well-known theory of the dielectric. He discovered benzene in 1825.

*Around the magnet, Faraday  
Was sure that Volta's lightning play;  
But how to draw them from the wire?  
He drew a lesson from the heart:  
'Tis when we meet, 'tis when we part,  
Breaks forth the electric fire.*

—HERBERT MAYO.

Of all men of the nineteenth century Faraday had the greatest power of drawing ideas straight out of his experiments and making his physical apparatus do his thinking, so that experimentation and inference were not two proceedings, but one.

1885, February.—Telephonic communication was established between Brussels and Paris by means of Dr. Cornelius Herz's micro-telephone.

HIPPOLYTE LOUIS FIZEAU.

*b. September 23, 1819. d.*

French natural philosopher. He distinguished himself by his researches into the properties and motion of light.

*Hail, holy light—offspring of heaven, first-born!  
Bright effluence of bright essence increate!  
Or, hear'st thou, rather, pure etheral stream,  
Whose fountain who shall tell?—Before the sun,  
Before the Heavens, thou wert, and, at the voice  
Of God, as with a mantle, didst invest  
The rising world of waters, dark and deep  
Won from the void and formless infinite.*

—MILTON.

*The sun digs the ore from our mines; he rolls the iron, he rivets the plates, he boils the water, he draws the train. He not only grows the cotton, but he spins the fibre and weaves the web. There is not a hammer raised, a wheel turned or a shuttle thrown, that is not raised and thrown and turned by the sun. His energy is poured freely into space, but our world is a halting-place where this energy is conditioned.*

—*The Influences of the Sun*: JOHN TYNDALL.

1851, November 24.—Thomas O'Connor Sloane was born. He devised a method for the determination of sulphur in illuminating gas. He invented the thermophote which is the only apparatus ever devised for registering automatically and mechanically the illuminating power of gas.

1050.—Magnifying glasses were invented by Alhazen.

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MEMORANDA AND DIARY.

## SEPTEMBER 24.

NATHAN WESTON SPAULDING.

b. *September 24, 1829.*

d.

American inventor. In 1859 he opened a saw manufactory in Sacramento, where he devised the adjustable saw-tooth that has made him widely known, and he brought out the chisel-bit saw-tooth. He completed and published a scale for the measurement of logs, which has been adopted as the legal standard in many States.

*Hark! the round saw's buzzing whirr*

*Through the oak and maple, beech and fir;*

*The boards pile high in measured heaps,*

*The sawyer close the record keeps.*

*All hail, then, Labor! Saviour true*

*From all the ills the slothful brew;*

*Bright badge of entrance into Heaven,*

*To every hand industrious given.*

—*Labor*: ANONYMOUS.

1565.—Veneer mills were invented by Reener at Augsburg, Bavaria.

1780.—The circular saw was invented by Gervinus.

1820.—A planing-machine for wood was constructed by Bramah.

1808.—William Newberry invented the first band saw.

1819.—The first saw-maker's anvil was brought to America.

1820.—Carpenters' steel squares were first manufactured at Bennington, Vt.

1828.—Wm. Woodworth's planing-machine was introduced.

PHILIPPUS AUREOLUS PARACELSUS THEOPHRASTUS BOMBASTUS.

b. 1493.

d. *September 24, 1541.*

Swiss physician and chemist. He combined chemistry and medicine, freed chemistry from the restrictive fetters of alchemy by a clear definition of scientific aims and did much to spread the iatrochemical doctrine. He taught that the object of chemistry was to prepare medicines, and he enriched medicine with a large number of valuable preparations. He was the first to give a name to copper vitriol, corrosive sublimate, sugar of lead and various antimony compounds as medicines. He brought into use dilute sulphuric acid, tincture of iron and iron saffron. He might properly be called the father of pharmacy.

*In the great laboratory of nature this power is doubtless the chief agent by which chemical changes are wrought; and in "earth's hidden chambers" it is believed to be constantly in operation, separating compounds and from their elements forming new combinations. Modern science has learned to imitate, though on a feeble scale, some of its wonders; and although it has not discovered the long-sought "philosopher's stone," which was supposed to be able to transmute the baser metals into gold, it has, nevertheless, in the development which it has given to the useful arts, done a better service to mankind than the older alchemists ever dreamed of.*

## OCTOBER 9.

EMIL FISCHER.

*b. October 9, 1852. d.*

German chemist. He has succeeded in synthesizing fruit and grape sugars. The hydrazines, which stand in near relation to the diazo-compounds, were discovered by him in 1875.

*The glorious sun*

*Slays in his course, and plays the alchemist;*

*Turning with splendor of his precious eye,*

*The meager cloddy earth to glittering gold (suec).*

—*King John*: SHAKESPEARE.

*From Nature's magic hand whose touch makes sadness*

*Essential gladness,*

*The reverent mortal Alchemist may learn*

*The art to turn*

*Fate's roughest, hardest, most forbidding cross,*

*Into the metal gold that knows not change or loss.*

—HORACE SMITH.

1788, April 28—1881, April 20.—Charles Frederick Achard lived. He extracted sugar from beets successfully, and in his essays on the subject, he contributed much to introduce this industry into France.

1811.—Sugar was made from starch by Kischof at St. Petersburg.

1817 (about).—Arfredson discovered lithium.

1824.—Cobalt blue was discovered by Johann G. Kopfer.

1839.—G. C. Caldwell published the pioneer work on agricultural analysis.

WILLIAM TURNBULL.

*b. October 9, 1800. d. December 9, 1857.*

American engineer. From 1832-'43 he was topographical engineer of the Potomac Aqueduct; he had charge of Lake Ontario harbor improvement, the extension of Buffalo Harbor, and the improvement of Lakes Champlain, Ontario and Erie. During 1848-'49 he had charge of the construction of the New Orleans custom-house and the lighthouse for Oswego Harbor, N. Y., and in 1853-'55 harbor improvements of Lakes Champlain and Ontario, the eastern part of Lake Erie in 1856, and of Cape Fear River, N. C., in 1856-'57.

*The great progress which the arts and sciences have attained in our time is doubtless largely the result of the research, study and observation of men of past ages, but it may be claimed that to the knowledge, experience and accumulated skill of the men of the present enlightened period is due the development of the material of nature to practical use; and it may be claimed, also, that in the domain of practical thought and action the engineer of today stands in the front rank. He has become the pioneer of civilization. The material monuments throughout the land, the wealth of communities, and the colossal fortunes of individuals attest his skill, courage and devotion in the pursuit of his calling, and stamp him as an important intellectual factor in the success of men and in the general progress of our time.*

—*Association of Engineers' Societies*;  
*Annual Address of President of Western Society, 1888.*

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## OCTOBER 8.

HENRI PRUDENCE GAMBEY.

*b. October 8, 1787.*

*d. January 28-29, 1847.*

French instrument maker. Designed and made a machine for graduating astronomical instruments and invented a repeating theodolite with two circles, the one vertical, the other horizontal; also a heliostat and a compass.

*We see but half the causes of our deeds,  
Seeking them wholly in the outer life,  
And heedless of the enstriving spirit-world,  
Which, though unseen, is felt, and sows in us  
All germs of pure and world-wide purposes.  
From one stage of our being to the next  
We pass unconscious o'er a slender bridge,  
The momentary work of unseen hands,  
Which crumbles down behind us; looking back,  
We see the other shore, the gulf between.  
And, marvelling how we won to where we stand,  
Content ourselves to call the builder Chance.*

—*A Glance Behind the Curtain*; LOWELL.

1600.—Davis's quadrant, or backstaff for measuring angles, was invented.

1602.—The measuring-compass was invented by Jost Bing of Hesse.

1607.—Rev. William Barlow invented the compass-box and hanging compass.

1609.—Jakob Metius, a Dutch astronomer, was regarded by Descartes and others as the inventor of the refracting telescope. This invention was claimed for Hans Lippershey and Zacharias Jansen.

FREDERICK JUENGLING.

*b. October 8, 1846.*

*d.*

American artist and engraver. One of the founders of the American Society of Wood-Engravers. As an engraver he takes rank with the best in the country.

*The world is always ready to receive talent with open arms. Very often it does not know what to do with genius. Talent is a docile creature. It bows its head meekly while the world slips the collar over it. It backs into the shafts like a lamb. It draws its load cheerfully, and is patient of the bit and of the whip. But genius is always impatient of its harness; its wild blood makes it hard to train. Talent is a very common family trait; genius belongs rather to individuals. Talent is often to be envied, and genius very commonly to be pitied. It is a perpetual insult to mediocrity; its every word is a trespass against somebody's vested ideas.*

—*The Professor at the Breakfast-Table*; HOLMES.

1755-1808, December 6.—Nicholas Jacques Conte lived. He invented a hydraulic machine; in 1793 he secured the decomposition of water by iron instead of sulphuric acid. He invented a graving machine which economized the time and trouble of artists, and introduced in France the manufacture of crayons.

1763.—Aquatinta was greatly improved at Paris.

1818.—Engraving on soft steel, which was afterwards to be hardened, was introduced into England by Perkins and Heath, of Philadelphia, U. S. A.

1870, January 17.—Alexander Anderson, the first wood engraver in America, died.

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## OCTOBER 7.

LEROY CLARK COOLEY.

*b. October 7, 1833.*

*d.*

American chemist. From 1861-'74 professor of natural sciences in State Normal School, when he became professor of chemistry and physics, and in 1868 invented an electric register by which piano vibrations and tuning forks left an imprint of their vibration, which was the first successful application of electricity to the purpose of recording swift periodic impulses in permanent characters.

*Drops do pierce the stubborn flint  
Not by force, but often falling;  
Custom kills with feeble dint.*

*More by use than strength prevailing.  
Single sands have little weight;  
Many make a drowning freight.*

—ROBERT SOUTHWELL.

*Science may be regarded as a maximum or minimum problem, exactly as the business of the merchant. In fact, the intellectual activity of natural inquiry is not so greatly different from that exercised in ordinary life as is usually supposed.*

—*Popular Scientific Lectures*: ERNST MACB.

1814.—Joseph Nicéphore Niepce began his researches on the action of light on prepared surfaces. In 1827 he gave specimens of photogalvanography, the art of producing engravings by the action of light and electricity.

1835, February 21.—Talbot obtained permanent photograph prints and camera images.

JOHN MAYOW.

*b. May 1643.*

*d. October 7, 1679.*

English physiologist and chemist. In his work "On Nitre and Nitro-Aerial Spirit" he originated some of the most important modern discoveries in pneumatic chemistry. He made the discovery of the double articulation of the ribs with the spine and put forward views with regard to the function of the internal intercostals which are still under discussion.

*What fingers brace the tender nerves, the twisting fibres spin?  
Who clothes in flesh the hardening loom, and weaves the sicken skin!*

*Thou taught the wondering tides of blood to leave the vital urn—  
Thou taught each limb in purple streams, and faithfully return,  
How thou the nerves to hear the will, the heavy limbs to wield—  
The tongue ten thousand tastes to tell, ten thousand accents yield?*

*How know the lungs to heave and pant, or how the fringed lid  
To guard the tearful eye, or brush the sulced ball unbid?  
How knows the eye to catch the view, and tell the senses round;  
The delicate and winding ear to image every sound?*

—*Mechanism of Man*.

1816.—Paris. Rene Theodore Hyacinthe Laennec invented the stethoscope, or "breast-explorer," the principle of which is now termed "auscultation."

1893, November 26.—Dr. Dawbarn, of the New York Polyclinic Hospital, made a successful operation on a patient with a fractured vertebra with the prospect of perfect recovery.

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## OCTOBER 6.

JOHN WILLIS GREFFITHS.

b. October 6, 1809.

d. April 29, 1882.

American naval architect. Suggested the clipper model of fast ships built for the China trade and in 1835 proposed the ram for the bow of warships. In 1864 he invented a timber bending machine, which he first used in building the ship "New Era" in Boston in 1870. He was the originator of the idea of life-boat steamers. Other inventions by him are iron keelsons for wooden ships (1848); bilge keels to prevent rolling (1863); triple screws for great speed (1866) and improved rivets (1880). His important work is a "Treatise on Marine and Naval Architecture" (1850). Its publication did more to advance American ship-building than any other single influence.

*With her funnels pouring curling smoke-wreaths back,  
With her engines quivering, shivering, night and day,  
With her helm put upon the homeward track—  
The roaring ocean leaps to her in spray!  
With her turrets looming solemn in the sun,  
With her broadsides sweeping through the rolling deep,  
She, the sister of the light and heavy gun,  
Feels the impulse of her great propeller's sweep!*  
—*The Olympia*; FOLGER MOKINSEY.

1500.—Discharges, a shipbuilder at Brest, first provided war vessels with port-holes.

1836.—Smith and Ericson obtained a patent for a screw propeller which resembled Lytleton's original contrivance.

GEORGE WESTINGHOUSE, JR.

b. October 6, 1846.

d.

American inventor, to whom is due the railroad air-brake (1868). He was largely instrumental in revolutionizing Pittsburgh by the introduction of natural gas. Before he was fifteen he had modeled and built a steam engine. One of his valuable inventions was a steel railroad frog (1868) and another, the air-brake, which is universally used upon railroad trains, both passenger and freight. Later he turned his attention toward electric machinery for lighting and power, especially as applied to railroad purposes, and many useful devices have resulted.

*Of fertile genius him they nurtured well,  
In every science and in every art,  
By which mankind the thoughtless brutes excel,  
That can, or use, or joy, or grace impart,  
Disclosing all the powers of head and heart;  
Nor were the goodly exercises spared  
That brace the nerves, or make the limbs alert,  
And mix elastic force with firmness hard;  
Was never knight on ground more be with him compared.*  
—JAMES THOMSON.

1838.—The first screw propeller, the "Archimedes," was built on the Thames by H. Wimsurst. She made 9 miles an hour.

1860.—American merchant marine was at greatest prosperity.

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## OCTOBER 5.

JAMES STEWART.

b. d. October 5, 1859.

Scottish mechanic and inventor; also manufacturer of lathes for jewelers. He invented a machine for making hooks and eyes, which had previously been done by hand, and was also the inventor of a seraphine.

*The huge, rough stones from out the mine,  
Unslightly and unglam'rous,  
Have veins of purest metal hid  
Beneath the surface there.  
Believe me, too, that rugged souls,  
Beneath their rudeness hide  
Much that is beautiful and good—  
We've all our angel side.*

—We've All Our Angel Side.

*Great Lapidary, fix upon Thy mill  
This soiled earth! Wipe off the mould of green.  
The writhing life, vermicular, obscene,  
The slime of sea, the scurf of town and hill.  
Then grind, O Lapidary! Labor still;  
Polish the lifeless, primal granite clean,  
Thy mirrored true, shines from its heart serene  
The undistorted image of Thy will.*

—W. M. S. JOHNSON.

1750-1835.—Abel Buell lived. He was an American mechanic and discovered the art of polishing crystals in 1766. The first lapidary machine is believed to have been constructed by him. He was also employed by the State in coinage and devised all of his own apparatus. He also invented a process for casting printing type.

JOHANN GOTTLIEB GLEDITSCH.

b. February 5, 1714. d. October 5, 1786.

German botanist. He acquired distinction by the application of botany to rural economy. He published "A System of Plants Founded on the Position of the Stamens" (1764), "Essays on Physics, Botany and Economy" (1767) and an "Introduction to Forest Science" (1774).

*Thus with a Hermetic art, the Adept combines  
The royal acid with cobaltic mines;  
Marks, with quick pen, in lines unseen portray'd  
The blushing metal, green dell and dusky glade;  
Shades, with pellucid clouds, the tinnest field,  
And all the future Group exists conceal'd;  
Thy, waked by fire, the dawning tablet glows,  
Green springs the herb, the purple flower blows;  
Hills, vales and woods, in bright succession rise,  
And all the living landscape charms his eyes.*

—Botanic Garden: DR. DARWIN.

*The farmer's office is precise and important, but you must not try to paint him in rose-color; you cannot make pretty compliments to fide and gratification, whose minister he is. He represents the necessities. It is the beauty of the great economy of the world that makes his comeliness.*

—Farming: EMERSON.

1830.—The Spaniards brought chocolate from Mexico. 1832.—Rice culture was an industry in Lombardy.

1600.—The Portuguese introduced the tobacco plant into India.

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## OCTOBER 4.

THOMAS CORWIN MENDENHALL.

b. October 4, 1841.

d.

American physicist. He was a Professor of Physics in the Imperial University in Tokio, Japan, and organized the courses of physics and the physical laboratory of the university. He made elaborate measurements of the wave-lengths of the principal Fraunhofer lines of the solar spectrum by means of a large spectrometer. He became interested in earthquake phenomena while in Japan and was one of the founders of the Seismological Society of Tokio. He was the first to devise and put into operation a system of weather signals for display on railway trains and in the U. S. Signal Service stations for the systematic observation of earthquake phenomena. He made a report on the Charleston earthquake of August 31, 1886.

*The rocks fall headlong, and the valleys rise,  
The rivers die into offensive pools,  
And, charr'd with putrid verdure, breathe a gross  
And mortal miasme into all the air.  
What solid was, by transformation strange,  
Grows fluid; and the fixed and rooted earth,  
Torn into billows, heaves and swells,  
Or with Vortioxious and hideous whirl  
Sucks down its prey insatiable.*

—COWPER.

CHRISTIAN PHILIPP OBERKAMPE.

b. June 11, 1738.

d. October 4, 1815.

French founder of important manufactures; introduced the cotton manufacture into France, 1759.

*'Mid the dust, and speed, and clamour,  
Of the loom-shed and the mill;  
'Midst the clink of wheel and hammer,  
Great results are growing still!*

—CHARLES SWAIN.

*And as he wove, and, weeping, still wove,  
A tempter stole him nigh;  
And with glazing words he to win him strove,  
But the Weaver turned his eye.  
He upward turned his eye to Heaven,  
And still wove on, on, on!  
'Till the last, last cord from his heart was riven,  
And the tissue strange was done.*

—The Weaver.

1690.—Art of calico printing was introduced into England from France.

1787.—Machinery was first used in France to spin cotton.

1790.—A weaving-machine was made by Joseph Marie Jacquard, near Lyons.

1790, about.—John Duncan invented the tambouring machine which produced flowers and figures upon muslins. His first machine was very imperfect, but he succeeded in rendering his machine automatic and it was operated by a steam engine.

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MEMORANDA AND DIARY.

# OCTOBER 3.

ELIAS HOWE.

b. July 9, 1819.

d. October 3, 1867.

American inventor of the sewing-machine, which invention was perfected in May, 1845, after five years of experimenting, and patented September 10, 1846. Great difficulty was met in the introduction of this useful invention in America and in England. He became in the end very rich after having passed through periods of great depression of fortune.

*With fingers weary and worn,  
With eyelids heavy and red,  
A woman sat in unwomanly rags,  
Plying her needle and thread—*

*Stitch! stitch! stitch!  
In poverty, hunger, and dirt,  
And still with a voice of dolorous pitch—  
Would that its tone could reach the rich!—  
She sung this "Song of the Shirt!"*

—*Song of the Shirt*; Hoop.

1760.—Hargreaves contrived a carding-machine.

1794.—Cotton sewing-thread was first manufactured at Pawtucket, R. I.

1840, January 8.—Isaac Wixan Lamb was born. 1850.—He was the American inventor of a braiding-machine that braided any number of strands; patented June 28, 1863.—He also invented a knitting machine that knitted either flat or tubular work, and that widened or narrowed; patented September 15,

1841.—Elias Howe, mechanic, of Cambridge, invented first practical sewing-machine.

JOHN GORRIE.

b. October 3, 1803.

d. June 16, 1855.

American physician and inventor. In 1850 he patented a machine for making ice. He is unquestionably the original inventor of the artificial methods of producing ice.

*Without labor there were no ease, no rest, so much  
as conceivable.* —CARLYLE.

*The Past is for us; but the sole terms on which  
it can become ours are its subordination to the  
Present. Only an inventor knows how to borrow,  
and every man is or should be an inventor.*

—*Quotation and Originality.*

*To toll or saunter, to laugh or to weep,  
Waken the echoes, or silence to keep,  
With no human being at hand to intrude,  
Or question the wherefore of manner or mood.*

*Oh! for the leisure to sit without thought,  
Upon the mind's aret the ingot unwrought;  
The hammer's that beat in my temples at rest;  
Calm in life's atmosphere, calm in the breast!*

—*Drawing Rest*; ALL THE YEAR ROUND.

1781-84.—The composition of water was demonstrated by Henry Cavendish and James Watt.

1788.—Water was decomposed into oxygen and hydrogen gases by Lavoisier.

1806.—First cargo of ice was shipped for export to Martinique.

1843.—Dumas, the French chemist, pronounced hydrogen to be a metal.

1904.

SUNDAY.

1904.

MEMORANDA AND DIARY.

## OCTOBER 2.

DAVID MUSHET.

b. *October 2, 1773.*

d. *June 13, 1847.*

Scotch metallurgist. Discovered the Black-Band iron-stone in 1801. He became a most skilled assayer. Among the important results of his labors are: the preparation of steel from bar-iron by a direct process combining the iron with carbon; the discovery of the beneficial effects of oxide manganese on iron and steel; the use of oxides of iron in the puddling furnace in various modes of appliance; the production of pig-iron from the blast-furnace, suitable for puddling, without the intervention of the refinery and the application of the hot-blast to anthracite coal in iron smelting. He discovered Titanium in 1794.

*After with strange discordant noises,*

*The busy day is echoing;*

*And 'mid the hollow hum of voices*

*I hear the heavy hammer ring.*

*'Tis thus that man, with toil n'er ending*

*Efforts from heaven his daily bread;*

*Yet oft unseen the Gods are sending*

*The gifts of fortune on his head!*

—*The Secret*: SCHILLER.

1776, May 17–1842, May 6.—Prof. A. K. Eaton lived. He invented a process for making steel. He discovered the use of carbonic acid gas as an agent for decarbonization and invented the soda process.

WEBSTER WAGNER.

b. *October 2, 1817.*

d. *January 13, 1882.*

American inventor. He was a wagon-maker and later a freight agent on the New York Central Railroad. He invented the Wagner sleeping-car. In 1867 he manufactured the first drawing-room car and founded the Wagner Palace Car Company of which he was president until his death. He also invented the oval car-roof and patented the elevated panel.

*One of the workers of the world*

*Lying toiled and toiling died;*

*But others worked and the world went on*

*And was not changed when he was gone,*

*A strong arm stricken, a wide sail furled.*

—*Fallen Flowers*: ARTHUR O'SHAUGHNESSY.

1555.—Rude carriages were used.

1598.—The first coach was seen in Scotland.

1635.—Hackney coaches were first used in London.

1662.—The invention of the omnibus was ascribed to Pascal.

1833.—The safety cab was invented by Joseph A. Hansom, an English architect.

1867.—The first hotel-car, the "President," was built by the Great Western Railroad of Canada.

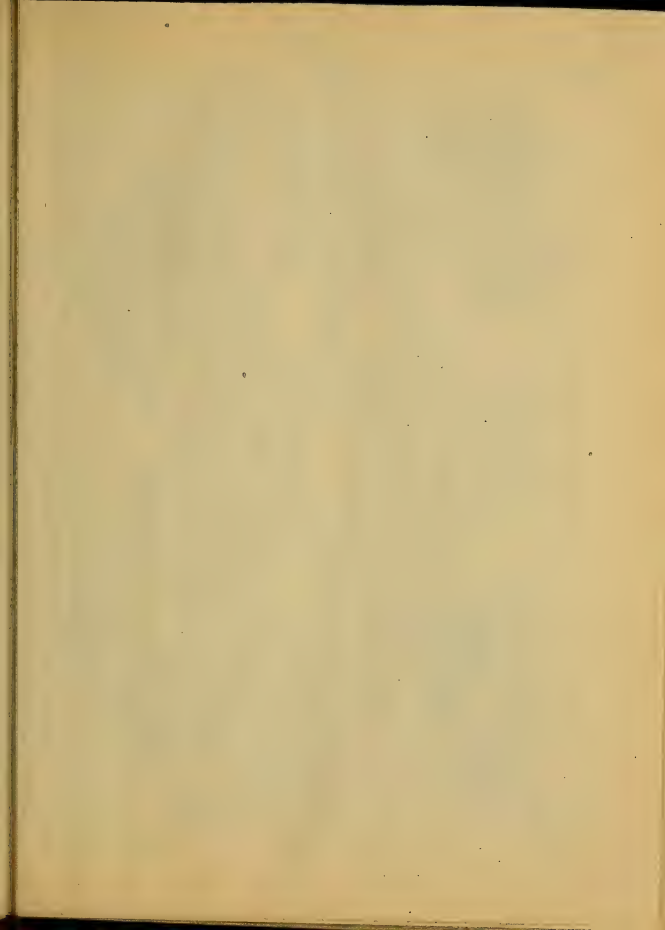
1868.—The first dining-car, the "Delmonico," was built by the Chicago & Alton R. R.

1904.

SATURDAY.

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MEMORANDA AND DIARY.



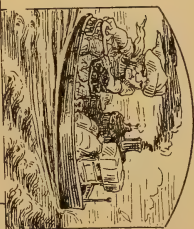


Well may we number, with admiring thought,  
 The slow advances time and science wrought,  
 Since enterprise, each danger prompt to  
 brave,  
 With her first feeble means essayed the wave.  
 Thus, with alternate progress and delay,  
 Ages on ages saw his timid way  
 Tread scarce more firm than while the world  
 was young,  
 Till when, at *Polton's* call, invention sprung  
 Instant to being, in full strength, and away  
 Her ready vessel steam's transcendent aid!

See how yon flaming herid trends  
 The ridged and rolling waves,  
 As, crashing o'er their crested heads,  
 She bows her surly slaves,  
 With foam before and fire behind,  
 She runs the clinging sea,  
 Then dies before the roaring wind,  
 Beneath her hissing ice.



SAIL-TEN ISNOTS  
 PER DAY



STEAM-TEN ISNOTS  
 PER HOUR



## OCTOBER 1.

### BENJAMIN BERKELEY HOTCHKISS.

*b. October 1, 1826.*

*d. February 14, 1885.*

American inventor. In 1856 he designed a rifle field-gun; in 1860 he submitted to the United States Government an improved system of rifling-belt and percussion fuse for projectiles; he invented an improved metallic cartridge case as a substitute for the paper-case then used in the French army; he made a revolving cannon which was adopted in Germany, Holland, Denmark, Russia, Italy, Austria, Chili, China, Norway and the United States; in 1875 he invented a magazine rifle and in 1882 a quick-firing gun which has since been adopted in France, England and the United States. At the time of his death he had the reputation of being the first artillery engineer in the world.

*Grave men they were, and battlings of fierce thought  
Had trampled out all softness from their brows,  
And ploughed rough furrows there before their time,  
For other crop than such as homely Peace  
Sows broadcast in the willing soil of youth.  
Care, not of self, but for the commonweal  
Had robbed their eyes of youth, and left instead  
A look of patient power and iron will,  
And something fiercer, too, that gave broad hint  
Of the plain weapons station'd at their sides.*

— *A Glimpse Behind the Curtain*: LOWELL.

1830-30.—Percussion caps came into use.

1839.—Christian F. Schonbein discovered ozone at Basel and in 1845 gun cotton and collodion.

### DOMINIQUE FRANÇOIS ARAGO.

*b. February 26, 1786.*

*d. October 2, 1853.*

French astronomer and natural philosopher. He advocated and made some discoveries in the science of electro-magnetism, undulatory theory of light, and he showed that there is no substance which is not capable, under certain conditions, of exhibiting signs of the magnetic virtue, and he proved that the best magnet is a bar of steel inclosed by a helix of copper wire.

*Such earnest natures are the fiery path,  
The compact nucleus, round which systems grow!  
Mass after mass becomes inspired thereby,  
And whirls impregnate with the central glow.*

*High worth is elevated place; 'tis more;  
It makes the post stand candidate for thee;  
Makes more than monarchs, makes an honest man!  
'Tho' no exchequer it commands, 'tis wealth;  
And tho' it wears no ribbon, 'tis renown;  
Renown, that would not quit thee, tho' disgraced,  
Nor leave thee pendulous on a master's smile.*

— *Night Thoughts*: YOUNG.

1837.—The telegraphs of Dr. Steinheil became known. Morse claims to be the first inventor of a practical electric telegraph.

1837.—The length of telegraphic communication established at Munich by Dr. Steinheil was an important practical advance in the system of extending wires.

1850, August 28.—The first attempt to establish a submarine circuit between Dover and Calais took place.

1904.

FRIDAY.

1904.

MEMORANDA AND DIARY.

## SEPTEMBER 30.

SYLVESTER MARSH.

b. *September 30, 1803.*

d. *December 30, 1884.*

American engineer. One of the founders of Chicago and a promoter of its prosperity. The meat-packing industry was originated by him and he invented many appliances that were incidental to its success. He invented the dried-meal process, and "Marsh's caloric dried meal" is still an article of commerce. The peculiar form of locomotive, cog-rail and brakes used on the railroad to the summit of Mt. Washington were invented by him. The road was formally opened August 14, 1868, as far as "Jacob's Ladder" and entirely completed in July, 1869.

*One age moves onward, and the next builds up  
Cities and gorgeous palaces, where stood  
The rude log-huts of those who tamed the wild,  
Rearing from out the forest they had felled  
To goodly frame-work of a fairer state;  
The builder's trowel and the seller's axe  
Are seldom withlaid by the selfsame hand.*

—A *Glance Behind the Curtain*: LOWELL.

1750.—Railroads, called tramways, in and about Newcastle, were made of wood, and were used for transporting coal a short distance to vessels.

1868, June 15.—The railway over Mont Genis was opened; length 48 miles. 1871, October 16.—Opened for traffic.

1862, May 21, 22.—The St. Gothard railway, between Lucerne and Milan, was opened.

JEAN LEPRINCE.

b. *September 30, 1781.*

French painter and inventor of aqua-tinta, the most precarious kind of engraving. Leprince kept the process a secret and sold his impressions for original drawings. He adorned the imperial palace at St. Petersburg.

*Books for the multitude—food for the mind,  
Knowledge that lifts and refines,  
Help for the feeble, the homeless and blind,  
These are humanity's lines.  
Art true and beautiful, too, to adorn  
The landscape, the park and hall.  
That all may rejoice, for genius is born  
To labor and shine for all.*

—*The Man of Gold*: PATRICK F. DUREAN.

*Such is the strength of art, rough things to shape,  
And of the rude commons rich enclosures make.*

—JAMES HOWELL.

1450.—Finiquerra Masso was the first artist to engrave on copper in Italy.

1832.—Etching on copper with aqua fortis was invented by Parmigiano.

1821.—Pastel-painting was invented by Bonet at Paris.

1824.—Etching on metal for printing was invented by Eberhard at Darmstadt.

1858.—Fox Talbot patented a photographic engraving process, by which pictures were etched on a plate by the action of light, and from which prints were made.

1904.

THURSDAY.

1904.

MEMORANDA AND DIARY.

## SEPTEMBER 29.

HENRY HOBSON RICHARDSON.

*b. September 29, 1838.*

*d. April 28, 1886.*

American architect. His earliest works were the railroad offices and the Agawam Bank in Springfield, Mass. His strongest works were the Brattle Street Church (1871) and Trinity Church, Boston. The latter was finished in 1877. He was employed on the State capitol at Albany with Leopold Eidlitz and Frederick Law Olmsted. A freely treated Romanesque preponderates in all his style.

*But let us now inside repair,  
And greet the holy chapel there!  
At once the whole seems clear and bright,  
Each ornament is bathed in light,  
And fraught with meaning to the sight.  
God's children! Thus your fortune prize,  
Be edified, and feast your eyes!*

—Songs: GOETHE.

*We are but builders, and each one  
Should cut and carve as best he can.  
Every life is but a stone,  
Every one shall hew his own.*

—*Make or Mar Shall Every Man:*

ANONYMOUS.

*Build deep, and high, and broad, young man,  
As the needful case demands;  
Let your title deeds be clear and bright,  
Till you enter your claim to the Lord of Light  
For the house not made with hands.*

—*Your House.*

THOMAS KINGSFORD.

*b. September 29, 1799.*

*d. November 28, 1869.*

American inventor of the process employed in the manufacture of corn starch in 1842. He, together with his son, experimented and improved their processes and obtained many patents therefor. Machinery of the most ingenious construction was used in their works.

*Who lags for dread of daily work,  
And has appointed task would shrink,  
Commits a folly and a crime;  
A soulless slave—a paltry knave—  
A clog upon the wheels of Time.  
With work to do, and store of health,  
The man's unworthy to be free,  
Who will not give, that he may live,  
His daily toil for daily fee.*

—*Daily Work:* MACKEY.

*O, there's a good in labor, if we labor but aright,  
That gives vigor to the daytime, and sweeter sleep at night;  
A good that bringeth pleasure even to the toiling hours,  
For duty cheers the spirit, as dew revives the flowers.  
Then say not that our God gave labor as a doom,  
No! 'tis the richest mercy from the cradle to the tomb.*

—*Music of Labor:* ANONYMOUS.

*Self-ease is pain; thy only rest  
Is labor for a worthy end,  
A toil that gains with what it yields,  
And scatters to its own increase  
And harvest while sowing outward fields  
The harvest song of inward peace.*

—*J. G. WHITTIER.*

1904.

WEDNESDAY.

1904.

MEMORANDA AND DIARY.

## SEPTEMBER 28.

### LOUIS PASTEUR.

b. *December 27, 1822.* d. *September 28, 1895.*

French chemist and bacteriologist. His first discovery of the resolution of racemic acid into the left and right-handed tartaric acids was received with incredulity, and his discovery of "anaerobic life" raised a storm of opposition. He discovered anthrax-vaccine. The Pasteur Institute was erected to do him honor. He was awarded the Albert medal for his researches in connection with fermentation, the preservation of wines, and the propagation of zymotic diseases in silkworms and domestic animals. He has achieved remarkable results in the prevention of hydrophobia. His brilliant overthrow of the theory of spontaneous generation occurred in 1861.

*The discoveries of great men never leave us; they are immortal; they contain those eternal truths which survive the shock of empires, outlive the struggles of rival creeds, and witness the decay of successive religions.*

—BUCKLE.

1877-78.—Pasteur and Reynaud discovered antitoxins.

1879.—Dr. Robert Koch identified the microscopical germs of cattle diseases, consumption, cholera and other diseases.

1884.—Nicolai and Rosenbaum discovered the bacillus of tetanus or lockjaw.

1888.—Pasteur Institute, for the treatment of rabies, was established in Paris.

### GEORGE KASPAR KIRCHMAIER.

b. *July 29, 1635.* d. *September 28, 1700.*

German chemist. The discovery of the art of etching on glass with fluorine is attributed to him. He wrote commentaries on the classics; "Dissertatio pro Hypothesi Tycheonica contra Dogma Copernicanum" (1658).

*The laws of wonder-working might,  
The stores my beauty brought to light,  
Inventive reason in soft union planned  
To blend together 'neath your forming hand.*

—The Artists: SCHILLER.

*The sturdy rock, for all its strength,  
By raging seas is rent in twain;  
The marble stone is pierced at length  
With little drops of awaking rain;  
The ox doth yield unto the yoke;  
The steel obey'th the hammer stroke.*

650.—The glazing of windows became common.

653.—Glass was rediscovered.

1000.—Glass-painting was invented.

1177.—Imported glass was used in the windows of private houses.

1500.—Glass-painting was executed at Marseilles. It soon attained great perfection.

1749.—Thomas Frye introduced painted porcelain.

1787, May 18.—The first attempt to engrave on glass was made at Toulouse.

1876, April.—De la Bastie invented the process for tempering or toughening glass by plunging it when heated into a hot bath of oleaginous or alkaline compounds.

1904.

TUESDAY.

1904.

MEMORANDA AND DIARY.



## SEPTEMBER 27.

JAMES BRINDLEY.

- b. 1716. d. September 27, 1772.

English canal engineer, Distinguished himself greatly in 1752 by the erection of a water engine for draining a coal mine at Clifton, in Lancashire. He was the engineer of the Trent and Mersey Canal, known as the Grand Trunk; the Staffordshire and Worcestershire Canal, which was completed in 1772, and the Bridgewater Canal, connecting Manchester and Liverpool.

*Your virgin trains on Brindley's cradle smiled,  
And nursed with pity love the unletter'd child,  
Spread round his pillow all your secret spells,  
So with strong arm immortal Brindley leads  
His long canals, and parts the velvet meads;  
Winding in lucid lines the watery mazes,  
Mines the firm rock, or loads the deep morass,  
Flings o'er a thousand streams its silver arms,  
Feeds the long vale, the nodding woodland lanes,  
And Plenty, Arts and Commerce freight the waves.*  
—Botanic Garden; Dr. DARWIN.

- 1776, March 21.—Bridgewater Canal was completed.  
1789, November 19.—The Thames and Severn were joined by a canal.

1856.—Grand Trunk R. R. was opened.

1867, November 11.—The first sod was cut for the Manchester Ship Canal at Taton.

1891, July 7.—The Manchester Ship Canal was opened.

ADOLF WILHELM HERMANN KOLBE.

- b. September 27, 1818. d. November 25, 1884.

German chemist. He proved that malonic acid resulted from cyan-acetic, discovered nitro-methane and made series of researches upon salicylic, paraoxybenzoic and isaoic acids. He discovered trichloro-methyl-hyposulphuric acid. He is regarded as the originator of the doctrine of the saturation-capacity of carbon.

*Oh, yes; they are all around us,  
And in every walk of life;  
Heroes the best, that stand the test  
In many an unmarked strife -  
Heroes of home, of shop, of farm,  
And at duty's call alone,  
Though unmeasure of honor's share,  
And by nobles fame unblown.*  
—NATHAN D. TURNER.

*Lose we a valued friend? To soothe our woe  
Let us bestow  
On those who still survive an added love,  
So shall we prove,  
How'er the dear departed we deplore,  
In friendship's sun and substance no diminut'd store.*  
—MORAL ALCHEMIST; HORACE SMITH.

1783-1852.—Ernst August Geitner, a chemist, lived. He was the first to use chromic salts for animal and vegetable dyes.

1841.—Boutin, a Frenchman, discovered polychromatic acid and cyanil, used in dyeing.

1904.

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MEMORANDA AND DIARY.

## SEPTEMBER 26.

PIERRE JOSEPH LAURENT.

*b.* 1715. *d.* 1773.

French engineer. He drained marshes in Flanders and Hainaut, which had been abandoned as impracticable; and also constructed sluices in rivers. The falls of water at Brunoy and Chauteloup were his work. He constructed an artificial arm for an invalid soldier.

*Difficult?* Yes, it will be difficult. *The short-fiber Cotton;* that too was difficult. *The waste cotton-shrub,* long useless, disobedient, as the thistle by the roadside,—have ye not conquered it; made it into beautiful bandana webs; White woven shirts for men; bright-tinted air-garments wherein fit goddesses? Ye have shivered mountains asunder, made the hard iron pliant to you as soft putty; the Forest-giants, Marsh-jinns bear sheaves of golden grain;—Agar the Sea-demon himself stretches his back for a sleek highway to you, and on Firehorses and Windhorses ye career. Ye are most strong. Thor red-bearded, with his blue sun-eyes, with his cheery heart and strong thunder-hammer, he and you have prevailed. Ye are most strong, ye Sons of the icy North, of the far East,—far marching from your rugged Eastern wilderness, hitherward from the gray Dawn of Time! Ye are Sons of the Jibun-land; the land of Dyfculties Conquered. *Difficult?* You must try this thing. Once try it with the understanding that it will and shall have to be done.

—*Past and Present*; CARLYLE.

JAMES FERGUSON.

*b.* August 31, 1797. *d.* September 26, 1867.

Scotch-American civil engineer and astronomer. He was assistant civil engineer on the Erie Canal in 1817-1819; assistant surveyor on the Boundary Commission under the Treaty of Ghent in 1819-1832; astronomical surveyor in 1832-1837; civil engineer for the State of Pennsylvania in 1827-1832; first assistant of the United States Coast Survey in 1833-1847, and assistant astronomer of the United States Naval Observatory from 1847 until his death. While there he discovered three asteroids.

*These earthly godfathers of heaven's lights,  
That give a name to every star,  
Have no more profit of their shining nights,  
Than those who walk, and not not what they are.*  
—*Love's Labor Lost*; SHAKESPEARE.

1761.—James Brindley practiced puddling of clay in making the walls of canals water-tight.

1796.—Parker patented Parker's cement, an argillaceous stone, calcined in kilns and afterwards reduced to powder.

1818.—Macadam's improved roads were introduced in London.

1824.—Portland cement was first mentioned.

1838-1868, November 25.—Johann Bausinger lived. He was foremost among German engineers in investigating the strength of materials. He was at the head of the mechanical and technical laboratory of the Royal Bavarian Polytechnicum.

1904.

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MEMORANDA AND DIARY.

# SEPTEMBER 25.

ABRAHAM GOTTLIEB WERNER.

*b. September 25, 1750. d. June 1817.*

German geologist and mineralogist. In 1774 he published "Treatise on the Characters of Minerals" proposing a methodical and precise language. This essay made a revolution in mineralogy. He applied the term geognosy to the science of the globe, and positions of minerals in the crust of the globe, and of the epochs of their origin. He presented this in his "Classification and Description of Mountains" (1787). He classified rocks as primitive, transitory, stratified and alluvial. He divined the order of superposition which is general all over the earth. He was the author of the Neptunian or Wernerian theory that the primitive and other rocks were formed by precipitation from water or some liquid.

*For Chaos heard his voice ; him all his train  
Followed in bright procession, to behold  
Creation, and the wonders of his might.  
Then staid the ferried wheels, and in his hand  
He took the golden compasses, prepared  
In God's eternal store, to circumscribe  
This universe, and all created things.*

—Raphael's Account of Creation; MILTON.

472.—Vesuvius was in a state of eruption ; the illumination was seen in Constantinople.

1186, September.—One of the cities of Calabria was swallowed up in the Adriatic.

1859.—The first artesian oil well was drilled at Titusville, Pa., by Drake.

ALFRED VAIL.

*b. September 25, 1807. d. January 18, 1859.*

American inventor. He made the telegraph practicable. He produced the first available Morse machine and invented the first combination of the horizontal lever motion to actuate a pen, pencil or stylus, and then applied Morse's telegraphic alphabet of dots, spaces and dashes, but Mr. Vail claims to have first applied it alphabetically. In 1844 he devised the lever and grooved roller which embossed on paper the characters, and the finger-key. On May 24, 1844, he received at Mount Claire Depot the first message from Washington. Prior to 1837 Morse and Joseph Henry worked alone ; from 1837-'44 Morse, Henry and Vail worked together, and the parts that Morse contributed were eliminated.

*Thought awakens ; now before us  
Lies the world in one embrace ;  
Quickly nation after nation  
The electric wires enlace ;  
Land to land is never drawing,  
City unto city bound ;  
Space becomes annihilated.*

*Thought bestrides the world around ;  
Thought hath scaled the lofty mountains,  
Valley unto valley chained ;  
Now it darts through ocean's caverns ; —  
Thought triumphant is proclaimed.*

—Thought and the Telegraph ; G. A. HAMILTON.

1904.

SATURDAY.

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MEMORANDA AND DIARY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 10.

BENJAMIN WRIGHT.

*b. October 10, 1770. d. August 24, 1842.*  
 American engineer. He studied mathematics by himself and surveying with his uncle, 1786. He surveyed the Mohawk River from Fort Stanwix to Schenectady and proposed a plan for its improvement. In 1816 he was engineer on the Erie Canal and to him with James Geddes is chiefly due the credit of the successful completion of the enterprise. He was also chief engineer of the Delaware Canal, the Chesapeake & Ohio Canal, the Harlem Railroad and the St. Lawrence Ship Canal. In 1834-'36 he conducted a survey for the route of the New York & Erie Railroad.

*You know, that, if you had a bent tube, one arm of which was of the size of a pipe-stem, and the other big enough to hold the ocean, water would stand at the same height in one as in the other. Controversy equalizes fools and wise men in the same way—and the fools know it.*  
*—The Autocrat of the Breakfast-Table: HOLMES.*

1817, July 4.—Construction of Erie Canal was begun by breaking ground near Rome.

1825, November 4.—First boat via Erie Canal arrived in New York.

1829.—Chesapeake & Delaware Canal was opened.

1895, June 17.—Harlem River Ship Canal was opened.

HENRY CAVENDISH.

*b. October 10, 1731. d. February 24, 1810.*

English chemist, mathematician, electrician, astronomer and geologist. Has been called the "Newton of Chemistry." He wrote only a few papers in the "Philosophical Transactions" between 1766 and 1809. His most notable achievement was his demonstration in 1781 of the composition of water. James Watt also reached the same conclusion about the same time. He ascertained that hydrogen air is at least twelve times lighter than common air, 1777.

*Nymphs! your soft smiles uncultured man subdued,  
 And charm'd the savage from his native wood;  
 You, while amazed his hurrying Hordes retire  
 From the fell havoc of devouring Fire,  
 Taught the first Art, with piny rods to raise,  
 By quick attrition, the domestic blaze,  
 Fan with soft breath, with kindling leaves provide,  
 And list the dread destroyer on his side.*  
*—Botanic Garden: DR. DARWIN.*

*Man carries the world in his head, the whole astronomy and chemistry suspended in a thought. Because the history of nature is characterized in his brain, therefore is he the prophet and discoverer of her secrets.*

—Nature: EMERSON.

1630, about-1684, about.—Johann Joachim Becker lived. He was the first who attempted to connect by a theory the scattered facts of chemistry. His theory was the basis of that perfected by Stahl.



1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 11.

HEINRICH WILHELM MATHIAS OLBERS.

b. *October 11, 1758.*

German astronomer and physician; he gained distinction by his observations on the comet of 1779 and he discovered an improved method of calculating the orbits of comets. In March, 1802, he discovered a new asteroid which he named Pallas and another in March, 1807, which he named Vesta. In 1815 he discovered the comet called by his name.

*Here Nature shall condense her powers,  
Her music, and her meteors,  
And tinging man to the blue deep  
Where stars their perfect courses keep,  
Like wise preceptor, lure his eye  
To sound the science of the sky,  
And carry learning to its height  
Of untried power and sane delight.*

—MONADNOCK; EMERSON.

1769.—A brilliant comet appeared. It passed with great swiftness and within 2,000,000 miles of the earth: its tail formed an arch 36,000,000 miles long.

1818, November 26.—"Encke's" Comet was discovered by Jean Louis Pons, director of the observatory at Marseilles, but named by astronomers after Prof. Johann Franz Encke of Berlin for his success in detecting its orbit, motions and perturbations.

1826, February 28.—Biela's Comet was discovered by M. Biela, an Austrian officer, at Josephstadt, Bohemia.

1861, June 29.—The great comet was first visible.

EHRENFRED WALTHER VON TSCHIRNHAUSE.

b. *April 10, 1651.*

*d. October 11, 1708.*

German geometician and experimental philosopher. He greatly improved the glass used for optical instruments; constructed an enormous burning mirror; developed the manufacture of Saxon porcelain and discovered a particular kind of curve which now bears his name.

*Let any young man select from his acquaintance  
a number of the most prominent men of any profession—men who are distinguished for talents, or public usefulness—and he will find that they are all,  
with scarcely an exception, men who began the world without a dollar. Look into the public councils of the nation; and who are they who take the lead in all its controlling interests? They are men who began the world with nothing, and have made their own fortunes. The rule is universal. It pervades our courts, both State and Federal, from the highest to the lowest. It is true of all the professions. It is so now; it has ever been so since we became a nation; and it will be so while our present institutions continue. And the history of the prominent men of this country is but a repetition of the history of the most distinguished men of all other countries.*

—*The Self-Made Men.*

1678-1743.—J. Astbury lived. He produced a white stone-ware of a very superior quality by mixing pipe-clay with Shelton marl. He was the first English potter who used calcined flint as an ingredient of his fabrics. By feigning to be an idiot, he obtained access to a workshop of a foreign potter and learned the secret processes used.

1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

# OCTOBER 12.

JOSIAH PARSONS COOK.

b. October 12, 1827.

d.

1894.

American chemist and Professor at Harvard College. He rendered the inductive methods of experimental science a means of liberal culture in the college, and also in the preparatory school. His investigation of the atomic weight of antimony (1880) was one of the most brilliant and perfect pieces of chemical work ever executed. His "New Chemistry" was the earliest exposition of a consistent system of chemistry based on the principles of molecular mechanics. Most of his contributions to chemical science have been collected in "Chemical and Physical Researches" (1881).

*For the world was built in order,*

*And the atoms march in tune;*

*Rhyme the nipe, and time the warder,*

*The sun obeys them and the moon.*

— Monatnock : EMERSON.

*Ah me! Experience (so we're told),*

*Time's crucible, turns lead to gold;*

*Yet what's experience won but dross,*

*Cloud-gold transmuted to our loss?*

*What but base coin the best event*

*To the untried experiment?*

— A Familiar Epistle to a Friend : LOWELL.

450 B. C.—Leucippus flourished and was a teacher of Democritus. He was the reputed author of the atomic philosophy.

KARL AUGUST STEINHEIL.

b. October 12, 1801.

d. September 12, 1870.

German electrician. A great pioneer of electric telegraphy on the European continent. In 1838 he made the first intelligent suggestion of a wireless telegraph. He introduced the return earth circuit in electric telegraphy and made numerous optical instruments.

*Yea, in the shaping of a grain of sand,*

*He sees the law that made the spheres to be—*

*Sees atom-worlds spun by the Hidden Hand,*

*To whirl about their small Alcione.*

*With spell of wizard Science on his eyes,*

*And augment on his arm, he probes through space;*

*Or pushes back the low, unfriendly skies,*

*To feel the wind of Saturn on his face.*

*He walks abroad upon the Zodiac,*

*To weigh the worlds in balances, to fuse*

*Suns in his crucible, and carry back*

*The spherat music and the cosmic news.*

— MARKHAM.

1793, May 16.—1839, October 15.—Louis Nicolas Vauquelin, a French chemist, lived. He improved the methods of chemical analysis and discovered two elementary substances—chromium and glucina.

1844, April 6.—Winfield Scott Sims was born. In 1872 he invented an electric motor for light work. He first applied electricity for the propulsion and guidance of movable torpedoes for harbor and coast defense. His torpedo is a submarine boat with a cylindrical hull of copper and conical ends, supplied with a screw propeller and rudder.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 13.

HENRY LOUIS JAQUET DROZ.

- b. *October 13, 1752.* d. *November 18, 1791.*  
 Swiss mechanic. He was the son of Peter Jaquet Droz and surpassed even his father. Among his inventions were a drawing figure and a figure of a woman playing on the piano. The player followed the notes with the head and eyes, got up when it had finished playing and made an obeisance to the company.

*As we surpass our father's skill,  
 Our sons will shame our own;  
 A thousand things are hidden still,  
 And not a hundred known.*

—MECHANOPHILUS.

Now the world's in need of artisans, who also use their brains  
 In diffusing useful knowledge into every line of trade,  
 For uncouth and careless workmen have no thought of taking pains,

Though the highest price is given for the best that can be made.  
 In the labor of the household, field or factory thou wilt find  
 That the brain e'er guides the motion of the hand possessing skill,

Thus improving every faculty of body, soul and mind  
 And enabling honest workmen every duty to fulfill.

There is dignity in doing well whatever we have to do;  
 Let us magnify our calling by example good and true.

—The Dignity of Labor: CHARLES W. SCARFF.

1783.—Francis Richards invented and patented the air-cushion door-spring. H. also invented the envelope machine, which prints, folds, gums, counts, and bands automatically 80,000 letter-envelopes per day. He also invented the automatic weighing machine for weighing all kinds of granular materials.

OTTO UNVERDORFEN.

- b. *October 13, 1806.* d. *December 27, 1873.*  
 German chemist. He first discovered aniline in 1826 in the products of the dry distillation of indigo.

*"I'll do what I can" is a challenge to fate,  
 And fate must succumb when it's put to the test;  
 A heart that is willing to labor and wait  
 In its tussle with life ever comes out the best.*

*It puts the blue imps of depression to rout;  
 And makes many difficult problems seem plain,  
 It mounts over obstacles, dissipates doubt,  
 And unravels kinks in life's curious chain.*

—ELLA WHEELER WILCOX.

1770.—Karl Wilhelm Scheele discovered tartaric acid; 1775, oxygen and bleaching with chlorine; 1779, glycerine; and in 1782, prussic acid.

1792, October.—Mineral tar was discovered in Scotland.

1803.—Jons Jakob Berzelius discovered cerium; 1817, selenium; 1818, silicon; 1824, tantalum columbium; 1838, thorium; and in 1844, zirconium.

1803.—Narcotin was discovered by Charles Derosne.

1832.—Narcin was discovered by Pierre Joseph Pelletier.

Robert A. Cheesbrough showed that if the residuum left in the still after the greater part of the petroleum had been driven off, be filtered through bone-black, a thick oily substance is produced which he called vaseline.

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 14.

CHARLES MINER DABOLL.

b. October 14, 1823.

d.

American inventor of the cast-iron bell-bottom jack-screw barrel and of a lathe for cutting the thread of jack-screws. He also made an oval slide parallel bench vise, a breast drill, a self-centring brace for bits, a sowing machine and the Daboll bushing.

*Our nineteenth century is the age of tools. They grow out of our structure. "Man is the metre of all things," said Aristotle; "the hand is the instrument of instruments, and the mind is the form of forms." The human body is the magazine of inventions, the patent office, where are the models from which every "int" was taken. All the tools and engines on earth are only extensions of its limbs and senses. — Works and Days: EMERSON.*

*Th' invention all admir'd, and each, how he  
To be th' inventor mies'd; so easy it seem'd,  
Once found, which yet unfound most would have thought  
Impossible.*  
— Paradise Lost: MILTON.

1827. January 28.—Coleman Sellers was born. He was an American engineer, and invented coupling devices for shafting (1857) and the essential factor in the modern system of interchangeable shafting parts; also (in 1865) of feed-disks for lathes or other machine tools. He was one of the consulting engineers of the Niagara Cataract Company.

1857.—A machine for converting spherical into rectilinear and other motions and for producing perfectly parallel motion, was discovered by V. Peaucellier, an engineer officer.

SIR ROBERT JOHN LEMESURIER McCLOURE.

b. January 28, 1807.

d. October 14, 1873.

British arctic explorer. In 1850 he began the voyage which secured to him lasting fame as the discoverer of the northwest passage. After his ship was frozen fast, he continued the exploration by sledges until he reached Melville or Barrow's straits, 1850–1851. This was called the first discovery of the northwest passage. The next season he discovered a second route on the north side of Baring Island. His party returned to England September 28, 1854.

*Hence keen incitement prompt the prying mind,  
By treacherous fears not palsied nor confined,  
Its curious search embrace the sea, and shore,  
And mine and ocean, earth and air, explore.*

*Thus shall the years proceed—till growing time  
Unfold the treasures of each differing clime;  
Till one vast brotherhood mankind unite  
In equal bands of knowledge and of right;  
Then, the proud column, to the smiling skies,  
In simple majesty subtime shall rise,  
O'er Ignorance Foot'd, their triumph loud proclaim,  
And bear inscribed, immortal, Darwin's name.*  
—To Dr. Darwin: E. H. SMITH.

986.—Herjulfson was the first Norse discoverer of America.  
1498.—Sebastian Cabot of England sailed up Davis Strait seeking a northwest passage to China.

1678.—Sir Martin Frobisher, while seeking a northwest passage, took possession of the west coast for Queen Elizabeth and called it West England.



1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 15.

### EVANGELISTA TORRICELLI.

b. *October 15, 1608.*

Italian physicist. Invented the instrument we now call the barometer, 1643, and demonstrated the phenomena of the pressure of air in 1645. He demonstrated the most important properties of the common centre of gravity of a system of connected bodies and discovered the law of the flow of fluids out of orifices, which is the foundation of the whole science of hydraulics. He discovered the area of the cycloid.

*He had a clear, honest face, whose rough-been strength  
Was mildened by the scholar's wiser heart  
To sober courage, such as best befits  
The unsullied temper of a well-taught mind.  
Yet so remained that one could plainly guess  
The hushed volcano smouldering underneath.  
He spoke; the other, hearing, kept his gaze  
Still fixed, as on some problem in the sky.*

—*A Glance Behind the Curtain*: LOWELL.

1648, September 19.—At the suggestion of Pascal, Perrier, his brother-in-law, demonstrated that the baroscope (barometer) could be used to determine altitudes.

1731-1805.—Christian Brunings lived. He invented the strom-messer, an instrument for measuring the rapidity of streams.

1743.—Clairant developed his formulæ of the equilibrium of fluids and applied it to the shape of the earth.

### FRANÇOIS MAGENDIE.

b. *October 15, 1783.*

French physiologist and physician. Admitted to the Academy of Sciences about 1821. He discovered and demonstrated the functions of the spinal nerves. The honor is shared by Charles Bell. Magendie discovered that in the circulation of the blood the arteries act by elasticity, and he proved that the veins are organs of absorption. He wrote "Lectures on the Physical Phenomena of Life" (1836-1842) and "Lectures on the Functions and Diseases of the Nervous System" (1839).

*The nerves, with equal wisdom made,  
Arising from the tender brain, pervade  
In secret pairs the chann'ld bone,  
And thence advance through paths and roads unknown  
Formed of the finest complicated thread,  
The num'rous cords are through the body spread.  
These subtle channels, such is every nerve,  
For vital functions, sense and motion serve—  
They help to labour and concord the food,  
Refine the chyle, and animate the blood,*  
—BLACKMERE.

1850.—Hermann F. Helmholtz invented the myographion, an apparatus for determining the velocity of the nervous current.

1859.—Prof. Owen's system of arranging mammalia according to the nature of their brains was introduced.

1904.

SATURDAY.

1904.

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MEMORANDA AND DIARY.

# OCTOBER 16.

MASON JEROME METCALF.

b. October 16, 1807.

d. July 23, 1883.

American inventor. He invented a method of producing letter stencils by means of dies, which he was the first to practice and bring into use. He invented a fan-wheel for ventilation and made many experiments with models for flying-machines, all of them involving the use of a fan-wheel or propeller.

*Then to new arts his cunning thought applies,  
And to improve the work of nature tries.  
A row of quills in gradual order plac'd,  
Rise by degrees in length from first to last;  
As on a cliff th' ascending thicket grows,  
Or, different reeds the rural pipe compose.  
Along the middle runs a twine of flax,  
The bottom stems are join'd by pliant wax.  
Thus, well compos'd, a hollow bending brings  
The fine composure into real wings.*

—Ovid's *Metamorphoses*.

1150.—Windmills were in general use in Netherlands.

1253.—Windmills were set up in Netherlands.

\*1264.—Windmills were in use in England.

1299.—Windmills were first known in Spain, France and Germany.

1854, June 13.—Charles Algernon Parsons was born. He built the "Turbina," the first steam turbine. He developed and applied the steam turbine as a high-speed, direct-coupled engine to drive a dynamo. His flying-machine was one of the first to use a steam engine of extremely light weight. It lifted itself into the air by means of a screw propeller.

ROBERT STEPHENSON.

b. October 16, 1803.

d. October 12, 1859.

English engineer; inventor of the tubular bridge. He was engineer of the London & Birmingham Line, the first railway in London. He built the famous Menai Bridge, which was opened for traffic on March 5, 1850; also the great Victoria Bridge over the St. Lawrence at Montreal, begun in 1854 and completed in 1859, and two others in Egypt. He was buried in Westminster Abbey by the side of Telford. He built the great viaduct over the river Tweed, at Berwick. He is the author of "On the Locomotive Steam Engine" and "On the Atmospheric Railway System."

*Crowned with the culture of the centuries,  
With honest mien and noble, manly pride,  
He gazes fearless back across the Past,  
Triumphant o'er the forces of the world,  
Fired by wisdom's sacred heritage,  
Imbued with ardent trust and sanguine hope,  
Strong driver of Progression's potent plow  
He presses onward certain of success—  
Upon his brow serene intelligence  
Reigns sovereign consort of integrity.*

—The Maker's Image: ALBERT C. ANDREWS.

1850.—First locomotive passed over Menai Bridge.

1855.—Victoria Bridge was carried away.

1859.—Victoria Railway Bridge was erected on tubular principle over St. Lawrence, Montreal.

1904.

SUNDAY.

1904.

MEMORANDA AND DIARY.

# OCTOBER 17.

EDWARD COWPER.

b. 1790.

d. October 17, 1852.

English inventor. In 1816 he patented a method of printing paper for paper hangings and other purposes. Its chief feature consisted in curving stereotype plates and fixing them on cylinders for printing long rolls of paper. In 1818 he made improvements and patented a better method of distribution of the ink and an improved manner of conveying the sheets from one cylinder to another. This was the origin of the "perfecting machine," which prints on both sides of the paper at once. He did for the printing machine what Watt did for the steam engine.

*Think! Oh, be machines no longer—  
Like the windmills by the wood,  
Think! 'twill make you fresher, stronger;  
Lend you to the great and good.*

*Thought exalts and lightens labor,  
Thought forbids the soul to sink!  
Self respect and love for neighbor  
Mark the men who work—and think!*  
—WORK and THINK; THEODORE F. SEWARD.

It is almost impossible to over-estimate the importance of these inventions. The Greeks would have elevated their authors among the gods; nor will the enlightened judgment of modern times deny them the place among their fellow-men which is so undeniably their due. — *Edinburgh Review.*

RÉNÉ ANTOINE FERCHAULT DE REAUMUR.

b. 1683.

d. October 17, 1756.

French physicist; discoverer of the composition of China, porcelain and inventor of the process of turning iron into steel and of extracting tin. He constructed a thermometer which maintains equal degrees of heat and cold, using what is called the Reaumur Scale. From 1708 till his death he was engaged in geometrical speculations; the strength of cordage; the development of the shells of testaceous animals; the coloring-matter of turquoisegems; the manufacture of iron, steel, porcelain; artificial incubation; the imitating of the famous purple dye of the ancients; the graduation of thermometers; the reproduction of the claws of lobsters and crabs; the instincts and habits of insects.

*Turn, turn, my wheel! What is begun  
At daybreak must at dark be done,  
To-morrow will be another day;  
To-morrow the hot furnace flame  
Will search the heart and try the frame,  
And stamp with honor or with shame  
These vessels made of clay.*

—KÉRAMOS: LONGFELLOW.

1490 B. C.—Crockery was made by the Egyptians and Greeks.

650 B. C.—Potters flourished in Corinth.

185 B. C.—Hard porcelain was invented by Sin-Ping of China.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 18.

RUDOLF EICKEMEYER.

*b. October 18, 1831. d. January 23, 1895.*

American inventor. He devised a useful form of dynamo, used for elevators and hoisting apparatus. In 1854 he established a business of repairing tools used in the hat-shops. His improvements in hat-making were his shaving-machines, stretchers, blockers, pressers, ironers and sewing-machines. In 1861 he manufactured revolvers and afterward mowing-machines, having invented a driving mechanism for such machines. His first electrical invention, a dynamo, was for railroad trains; and a dynamo for low speeds which has proved valuable. He made improvements in armatures. He invented the magnetic balance by which iron can be weighed magnetically.

*There is a joy in sturdy manhood still,  
Bravery is joy; and he who says, I will,  
And turns with swelling heart and dares the fates,  
With firm resolve upon his purpose waits,  
Is happier for the deed; and he whose share  
Is honest toil, pits that against dull care.*

—WILL CARLETON.

- 1404.—Hats were first made at Paris by a Swiss.
- 1510.—Hats were first manufactured in England.
- 1680.—Embroidered gloves introduced into England.
- 1666.—Cashmere shawls brought to England.

ALLEN BENJAMIN WILSON.

*b. October 18, 1824. d. April 29, 1888.*

American inventor. He was a cabinet-maker and in 1849 invented a sewing-machine without ever having seen one, patented November 12, 1850. In 1851 he secured a patent for the rotating hook, which was designed to supersede the shuttle and to make the lock-stitch with greater rapidity, neatness and economy of power; in 1852 he devised the four-motion feed, subsequently adopted on all machines. Wilson entered into partnership with Nathaniel Wheeler and they had a small shop in Watertown. Their first machine sold for \$125; the demand increased and they removed the shop to Bridgeport, Conn., where they have made six hundred machines a day.

*Many facts concur to show that we must look deeper for our salvation than to steam, photography, balloons, or astronomy. These tools have some questionable properties. They are reagents. Machinery is aggressive. The weaver becomes a web, the machinist a machine. If you do not use the tools, they use you. All tools are in one sense edge-tools, and dangerous. A man builds a fine house; and now he has a master, and a task for life; he is to furnish, watch, show it, and keep it in repair, the rest of his days.*

—WORKS AND DAYS: EMERSON.



1904.

TUESDAY.

1904.

MEMORANDA AND DIARY.

## OCTOBER 19.

SIR CHARLES WHEATSTONE.

*b. February, 1802. d. October 19, 1875.*

English inventor. He invented the stereoscope and established the philosophy of binocular vision. To him and (Sir) William Fothergill Cooke are we indebted for the electric telegraph. They elaborated the five-needle and the two-needle telegraph which came into general use. He invented the magneto-electric letter-showing telegraph, a system of electro-magnetic clocks, a cryptograph or secret despatch writer, supposed to be indecipherable. He invented electric chronographs, automatic instruments of record, instruments for measuring electricity and electrical resistance, including the "rheostat." In 1819 he invented his magic lyre, called the "telephone." In 1866 made the first self-exciting electric machine; and in 1867 he read a paper before the Royal Society on the reaction principle in dynamo machines.

Away, away through the sightless air—  
Stretch forth your iron thread;  
For I would not dim my sandals' fair  
With the dust ye lamely tread;  
Ay, rear it up on its million piers—  
Let it reach the world around,  
And the journey ye make in a hundred years  
I'll clear at a single bound!

—The Song of Lightning; GEORGE W. CUTTER.

ROBERT LIVINGSTON STEVENS.

*b. October 18, 1787. d. April 20, 1856.*

American mechanical engineer; son of John Stevens, Jr. He increased the speed of steamboats to fifteen miles an hour in 1832. In 1821 he originated the present form of the ferry-boat and the ferry-slips. He adopted the overhead working-beam of 'Watt to navigation; in 1818, invented the cam-board cut-off and in 1821 the gallews-frame that is now used. He lengthened the piston stroke, and in 1826 invented the split water-wheel. In 1831 he invented the balance valve, a modification of the Cornish double-beat valve. In 1831 he made the first marine tubular boiler, and was among the first to use anthracite coal. He introduced mast and rods, and added great strength by his overhead truss-frame. He constructed the first iron-clad and produced a percussion shell.

Hammer, tongs and anvils ringing,

Waking echoes all day long,

In a deep-toned voice are singing,

Thrifty labor's joyful song; bounding,

From a thousand humming looms,

Night and day the notes are sounding,

Thro' the misty factory rooms.

Listen! workmen, to their playing,

There's advice in every clank;

Still they're singing—still they're saying—

While you labor, learn to think!

—Work and Think.

1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 20.

SIR CHRISTOPHER WREN.

*b. October 20, 1632. d. February 25, 1723.*

Wadham College, Oxford.

English architect and mathematician. At thirteen he invented an astronomical instrument and a pneumatic machine; at fifteen he wrote "A New System of Spherical Trigonometry." He made many discoveries in astronomy, natural philosophy and other sciences. Between 1668 and 1718 he built St. Paul's Cathedral, the Monument, the hospitals of Chelsea and Greenwich, various edifices at Oxford and Cambridge, Winchester Castle, the new part of Hampton Court and nearly sixty churches. He invented a planing implement. The practical use of the barometer to foretell the weather is attributed to him. He invented a method for the transfusion of blood from one animal to another. He contrived a thermometer to be its own register; an instrument to measure the rain that falls and he devised many subtle ways for easily finding the gravity of the atmosphere and the degrees of drought and moisture.

*A man that is young in years may be old in hours, if he have lost no time.*

—BACON.

*Age is opportunity no less  
Than youth itself, though in another dress,  
And as the evening twilight fades away  
The sky is filled with stars, invisible by day.*

—MORITURI SALUTAMUS.

ALFRED WINGATE CRAVEN.

*b. October 20, 1810. d. March 29, 1879.*

Columbia, 1829.

American engineer, who also studied law. He was a railroad engineer and manager; also engineer to Croton Water Board of New York. He supervised the building of Central Park Reservoir; the enlargement of pipes across High Bridge and the construction of the reservoir at Boyd's Corners, Putnam County. He also built the New York Central Tunnel. Original member of the American Society of Civil Engineers; director for many years and president from November, 1869, to November, 1871.

*Water leaps as if delighted,  
While the conquered foes retire;  
Pate contagion flees affrighted,  
With the baffled demon fire.  
Water shouts a glad hosanna,  
Bubbles up the earth to bless;  
Cheers it like the precious manna  
In the barren wilderness.*

*Round the aqueducts of story,  
As the mists of Lethe throng;  
Croton's waves, in all their glory,  
Troop in melody along,  
Ever sparkling, bright and single,  
Will this rock-ribbed spring appear,  
When posterity shall mingle  
Like the gathered waters here.*

1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

ALFRED NOBEL.

b. October 21, 1833.

Swedish engineer. Nitro-glycerine remained unapplied to practical uses until 1864, when Nobel began to develop its industrial value. 1866-'67, dynamite and glyoxaline were invented by him, and in 1876 he patented nitrogellation, blasting gelatin, or explosive gelatin. In 1888 he took out a patent for Nobel's smokeless powder or ballistite. The manufacture of artificial silk attracted his attention, but he attached more importance to his artificial india-rubber, patented in 1893-'94.

*How, then? By thinking. "By patient thought," said Newton. By earnest thinking. It is this that brings the Apollo Helvedere from the block of marble. It is this that sends the locomotive engine thundering on its conquering way. It is this that puts the nitro-glycerine through the backbone of the mountain. Original men are intense thinkers. Newton was so smitten with "the wild delight of thinking" that he once took the tip of the forefinger of his lady-love to put out the fire in his tobacco pipe. "The brute!" you say; but he was bringing brutum fulmen from the heavens.*

—Originality: REV. ELIAS NASON.

1833.—Sails to wooden paddles; speed and regularity.

1843.—Wood to iron hulls; strength and capacity.

1846.—The manufacture of high explosives was begun in Germany with gun-cotton.

1850.—Paddles to screws; economy and radius.

HENRY MILLER SHREVE.

b. October 21, 1785.

d. March 6, 1854.

American inventor. He built the "Washington" on a plan of his own invention with improvements which made it superior to Fulton's boat. By using a cam cut-off that he devised he was able to save three-fifths of the fuel. He invented a steam marine battering-ram for harbor defense.

*See how yon flaming herald treads  
The ridged and rolling waves,  
As, crashing o'er their crested heads,  
She bows her surly slaves.  
With foam before and fire behind,  
She rends the clinging sea,  
Then flies before the roaring wind,  
Beneath her hissing lee.*

—OLIVER WENDELL HOLMES.

*As a bird trims herself to the gale,  
I trim myself to the storm of time,  
I man the rudder, reef the sail,  
Obey the voice at eve obeyed at prime;  
Lowly faithful, banish fear.  
Right onward drive unharmed;  
The port, well worth the cruise, is near,  
And every wave is charmed.*

—Ternarius; EMERSON.

1855.—Simple to compound engines; economy, radius and capacity.

1879.—Iron to steel hulls; economy and capacity.

1886.—Tank steamers built.

1889.—Single to twin screws; safety and regularity.

1904.

FRIDAY.

1904.

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MEMORANDA AND DIARY.

## OCTOBER 22.

PIERRE GASSENDI.

*b. January 23, 1592. d. October 23, 1655.*

French philosopher and astronomer. Destined for the Church, he obtained the chairs of philosophy and theology in University of Aix. He was the first disciple of Bacon in France, and a friend of Galileo and Kepler. He was the first to observe the transit of Mercury (1631). The parhelia, the eclipses of Jupiter's satellites, and the magnetic needle afforded him subjects of profound research. He wrote "The Life, Opinions and Morals of Epicurus" (1647); "The Lives of Tycho Brahe and Copernicus" (1654).

*By night-fall shaded,  
The red lights from the clouds are faded;  
Leaving one palest amber line  
To mark the last of day's decline;  
And all o'er heaven is that clear  
The stars so love to wander through.  
They're rising from the silent deep,  
Like bright eyes opening after sleep.*

—The Lost Planet; L. E. L.

*I bear a record of thy wondrous power;  
Thou stand'st alone and needest not to shine  
With borrowed lustre; for the light is thine  
Which no man giveth; and, though comets tower  
Portentuous round thy sphere, thou still art bright;  
Though many a satellite about thee fall,  
Leaving their stations merged in trackless night,  
Yet take not they from that supernal light  
Which lives within thee, sole, and free of all.*

—WASHINGTON ALLSTON.

COLLIS POTTER HUNTINGTON.

*b. October 22, 1821. d. August 13, 1900.*

American railroad builder. He planned and perfected the whole California railroad system, built an Atlantic system, and developed an aggregate of 16,900 miles of steam water-lines, including the route to China and Japan; he was president of the Newport News and Mississippi Valley Company and vice-president of the Central Pacific and Southern Pacific railroad companies.

*Without the powers of your arms,  
And your industrious skill,  
All banners might as well be furled,  
For all the commerce of the world  
Would soon be standing still;  
Your strength gives force to every forge,  
And life to every mill.*

—Remember, Working Men; R. J. DERFEL.

1847.—Pacific Mail Steamship Company organized.

1862.—U. P. Railroad chartered.

1869.—First transcontinental railroad completed by junction of Union and Central Pacific.

1875.—A railroad from San Jose to Escuintla was begun and opened in 1880, June 18.

1812.—Steam ferries were made for the first time and put in use between New York and Jersey City.

1876, June 13.—The first railroad in China was opened for service (one-half of the line).



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MEMORANDA AND DIARY.

WALTER ABBOTT WOOD.

b. October 23, 1815. d.

American inventor of farming implements. Introduced the Manny harvesting machine with Wood's improvements. He improved and invented forms of mowers and reapers. His works are probably the most extensive of their kind in the world. He conducted his business alone until 1866, when it was organized into a stock company.

*By thee the plowshare rends the matted plain,  
Inhumes in level rows the living grain;  
Intrusive forests quit the cultured ground,  
And Ceres laughs with golden filets crown'd*

—Botanic Garden; DR. DARWIN.

*What is a farm but a mute gospel? The chaff and  
the wheat, weeds and plants, blight, rain, insects,  
sun—it is a sacred emblem from the first furrow of  
spring to the last stack which the snow of winter  
overtakes in the field.*

—Nature; EMERSON.

1799, April—1869, May.—Patrick Bell lived. He was inventor of an early type of a reaping machine, 1326. It was pushed before the team of horses. It lacked nothing in the way of proper gearing, but its cutting apparatus was defective.

1850.—E. Danforth produced a mowing machine, with two cutter blades moving in opposite directions.

1851.—The first mowing-machines were made in United States.

SAMUEL MOREY.

b. October 23, 1762. d. April 17, 1843.

American inventor. He patented a revolving steam engine July 14, 1815. On March 25, 1795, a patent was issued to him for a steam engine, the power being applied by crank motion to propel boats of any size.

*Ah! who ever thinks of the bold engineer,*

*As he stands by his weapon of steel,*

*And spurs on a steed to its maddened career,*

*In a thundering and ponderous reel?*

*Through the daylight, into the night, dark, dark,*

*He knows no affright, o'er ridges and bridges, decayed or strong,*

*How god-like he stands as he rushes along!*

*Who thinks of the bold engineer?*

—The Engineer.

*But pent and caged, unknowing*

*Which way the fight incline,*

*I keep my engines going*

*Beneath the water-line.*

*No praise or blame to spur me*

*In this my hour of trial,*

*I stand and grip the lever,*

*I stand and watch the dial.*

—J. H. K. ATKIN.

214.—Crist mills were in use in Ireland.

1078.—Tide mills were in use in Venice.

Morley Fletcher first constructed large wave-motors for the utilization of the rising and falling of the waves.

1840.—Jearum Atkins devised a water-wheel planned to absorb the momentum of moving stream.

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MEMORANDA AND DIARY.

ANTOON VAN LEUWENHOECK.

b. October 24, 1632.

d. August 26, 1723.

Dutch anatomist and physiologist. The "Father of Microscopy." He was a Dutch linen merchant, but constructed and used the microscope. With simple lenses, magnifying less than sixty diameters, he discovered, in 1674, in putrifying fluids and in the discharges of the body, minute, moving, living particles which he called "animalculæ." The theory that these "animalculæ" might be the cause of all disease was advanced. Pasteur, Koch and Cohn proved this a fallacy in 1876. In 1677 Leuwenhoeck first discovered the so-called animalcules in the spermatic fluid and noticed that seeds contained the young plant in miniature; in 1690 he discovered the continuity of the arteries with the veins, the chemical changes of the blood and the structure of the laminæ, which compose the crystalline lens of the eye. The discovery and perfection of the microscope was disputed, being claimed by Leuwenhoeck and Hartzoeker. The priority of invention is not determined.

*Wisdom, awful wisdom, which inspects,  
Discerns, compares, weights, separates, infers,  
Seizes the right, and holds it to the last;  
How rare! In senates, synods, sought in vain;  
Or, if there found, 'tis sacred to the few.  
—Night Thoughts: YOUNG.*

AIME ARGAND.

b. about 1750.

d. October 24, 1803.

Swiss physician and chemist; inventor of the Argand lamp. His improvement was that he made the wick in the form of a ring. The flame thus became a hollow cylinder with a current of air ascending through the inside so that the burning surface was doubled. His brother discovered the effect of a cylindrical chimney for the burner, by which the flame was steadied, a draught created and the greatest amount of light yielded.

*There is the power of being mastered by and possessed with an idea. How rare it is! I don't say how few men are so mastered and possessed: I say how few men have the power to be.*

—PHILLIPS BROOKS.

1921 B. C.—Oil lamps were used in the days of Abraham.

959.—Candlesticks were used.

1200.—Tallow candles were substituted for the tallow-dipped splinters of wood formerly used.

Lamps were mentioned in the early ages. They were in general use in London streets at the close of the eighteenth century. In 1801 London streets were lighted by oil-lamps, and in 1814 with gas-lamps.

1784.—Aime Argand, a Swiss, invented an improved lamp.

1826.—Kerosene was first used for illuminating.

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MEMORANDA AND DIARY.

# OCTOBER 25.

DUD DUDLEY.

- b. 1599. *d.* October 25, 1684. English manufacturer and metallurgist. He became manager of his father's works and proved the practicability of smelting iron with fuel made from pit-coal. A patent was granted February 22, 1630. When the civil war broke out he joined the royal forces, left his iron-works, and while in the army he turned his practical experience into account by directing the forging of drakes of bar-iron, which were found of great use. He succeeded in obtaining the means to prosecute his original invention after a long series of misfortunes and suffering.

*Now as this rayless gloom aside I fling,  
Thy realm of action spreading on the view,  
Calls to the sooty Blacksmith—be a king!  
Thy reign renew;  
Grasping thy mace again, arise and DO!*

*And as the massive hammer thunders down,  
Shaping the stubborn iron to the plan,  
Know that each stroke adds lustre to the crown,  
And yon wide span  
Of gazing planets shout—behold a MAN!*

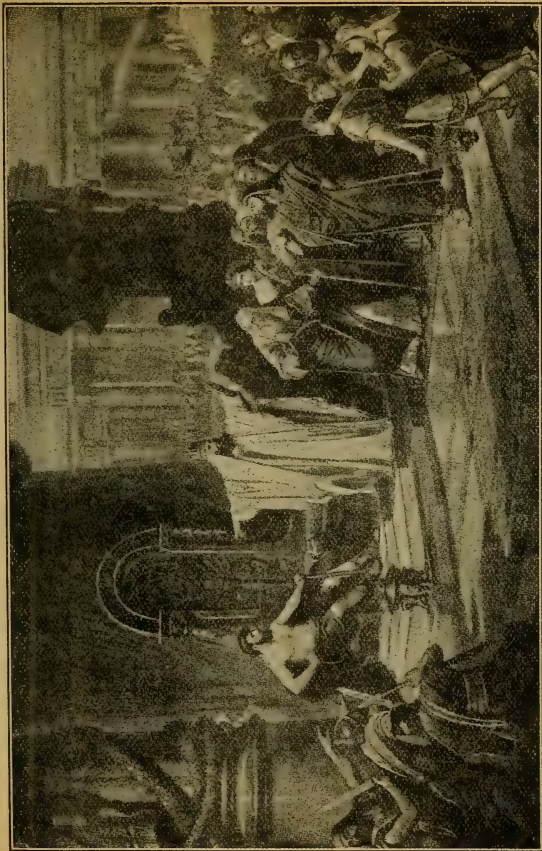
*A glorious Man! and thy renown shall be  
Borne by the winds and waters through all time  
While there's a keel to carve it on the sea  
From clime to clime,  
Or God ordains that idleness is crime!*

—The Blacksmith's Night; RALPH HOTT.

ORLANDO WHITNEY NORCROSS.

- b. October 25, 1839. *d.* American builder. After leaving school he worked in the leather business and later learned and practiced the carpenter's trade. After service in the civil war he, with his brother, James A., formed a copartnership, since well known as Norcross Brothers. In 1867 the firm built a Church at Leicester, Mass., and the business has since grown to be the largest on the continent. Among their buildings are: Chamber of Commerce (Cincinnati), Exchange Building (Boston), Bloomingdale Insane Asylum, Trinity Church (Boston), Corcoran Art Gallery (Washington), Library of Columbia College, and many state houses, court houses and public libraries. The business was conducted by O. W. Norcross solely from 1892 to 1902, when it was incorporated.

*Yes, thou dear, noble Mother! if ever men's praise  
Could be claimed for creating hercival lays,  
Thou hast won it; if ever the laurel divine  
Crowned the Maker and Builder, that glory is thine!  
Thy songs are right epic; they tell how this rude  
Roek-rib of our earth here was tamed and subdued;  
Thou hast written them plain on the face of the planet  
In brave, deathless letters of iron and granite;  
Thou hast printed them deep for all time; they are set  
From the same runic type-fount and alphabet  
With thy stout Berkshire hills and the arms of thy Bay—  
They are staves from the burly old Mayflower lay.  
—A Fable for Critics; LOWELL.*



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MEMORANDA AND DIARY.

## OCTOBER 26.

### INCREASE KIMBALL.

b. *October 26, 1777.* d. *September 16, 1856.*

American inventor. In 1804 he invented cut nails and devised the first machinery for their manufacture.

*The true epic of our times is, not arms and the man, but tools and the man,—an infinitely wider kind of epic.*

—CARLYLE.

*The painful smith, with force of fervent heat,  
The hardest iron soon doth melt;  
That with his heavy sledge he can it beat  
And fashion to what he it list apply.*

—SPENCER.

*Where sleep they, Earth? By no proud stone  
Their narrow court of rest is known;  
The still, sad glory of their name  
Hallows no mountain into fame;  
No, not a tree the record bears  
Of their deep thoughts and lonely prayers.*

—THE GRAVES OF MARTYRS.

1777.—First factory for the manufacture of cold-cut iron nails was opened at Cumberland, R. I.

1813.—John Ravenson obtained a patent for smelting iron with bituminous coal and in 1819 another was granted to Lord Dudley. It was not until 100 years later that it came into general use.

1759.—The Carron smelting was established; following Dr. John Roebuck's invention, iron was made by the use of mineral coal.

1833.—Frederick W. Geisenhainer obtained a patent for the use of the hot blast with anthracite coal.

### JOHN BLACK CORNELL.

b. 1825. d. *October 26, 1887.*

American inventor. On September 12, 1854, he patented an improved method of uniting the sheet-metal slats of revolving shutters for store-fronts and in 1856 a new plaster-supporting metallic surface for fireproof partitions, metallic lath.

*Iron is not only the soul of every other manufacture, but the mainspring perhaps of civilized society.*

—FRANCIS HORNER.

*No way has been found for making heroism easy, even for the scholar. Labor, iron labor, is for him. The world was created as an audience for him; the atoms of which it is made are opportunities.*

—GREATNESS: EMERSON.

*Take heart, all who toil! all youths in humble situations, all in adverse circumstances. If it be but to drive the plough, strive to do well; if only to cut bolts, make good ones; or to blow the bellows, keep the iron hot. It is attention to business that lifts the feet higher up on the ladder.*

1863.—The first wire-mill in England was erected at Mortlake.

1840.—Robert Sterling Newall, of Gateshead, patented wire rope for submarine telegraph cables.

1841.—Presses for shaping and cutting metal forms were invented by T. Griffiths.

1838.—John N. Golding invented and patented his first machine for making expanded metal.

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## OCTOBER 27.

ALBERT FINK.

b. *October 27, 1827.*

d.

German-American civil engineer. He designed and built the first important iron bridges in this country—one over the Monongahela River and the Viaduct over Trey Run. He was consulting engineer of the Norfolk and Petersburg Railway and designed the bridge at Norfolk. He built the Green River Bridge, one over the Cumberland at Nashville and one over the Ohio at Louisville. His plan for the creation of the Southern Railway and Steamship Association was adopted, and he was able to effect a complete revolution of the traffic management of the important American railways.

*At whose command vast structures rise,  
Towering upward to the skies;  
Those wondrous works in Nature's field,  
His fellow-man rich blessings yield;  
In all the world none more should be  
Respected, honored, loved, than he.  
His name—need it be mentioned here—  
Is this: "The Civil Engineer."  
—The Civil Engineer: O. H. SHEFFIELD.*

1840.—Mitchell introduced the screw pile.

1855, March 8.—Niagara Railway Suspension Bridge first crossed.

1870 (about).—Johann G. H. Gerber, C. E., patented the so-called cantilever system of bridges.

1890, March 4.—The great cantilever bridge across the Forth River was opened in Edinburgh, Scotland.

ERASMUS D. LEAVITT.

b. *October 27, 1836.*

d.

American mechanical engineer and one of the founders of the American Society of Mechanical Engineers. To him belongs the credit of first studying scientifically the economic duty of pumping engines for supplying cities with water. His Lynn engine was, when designed and put in operation, a remarkable advance on what had previously been accomplished. He did great work for the Calumet and Hecla Mining Company in designing and building its machinery.

*Nymphs! you first taught to pierce the secret caves  
Of humid earth, and lift her ponderous waves;  
Bade with quick stroke the sliding piston bear  
The viewless columns of incumbent air—  
Press'd by the incumbent air the floods below,  
Through opening valves in foaming torrents flow,  
Foot after foot with lessen'd impulse move,  
And rising seek the vacancy above.  
—Botanic Garden: DR. DARWIN.*

1775, August 27—1847, April 13.—Frederic Graff lived. He was employed as assistant engineer in erecting the first water-works in Philadelphia. On April 1, 1805, he was elected superintendent and engineer of the works. He devised the iron pipe system which is now universally used. Patterns of his fire-plugs and stop-cocks were sent to Europe.

1837.—Water was first conveyed to London in leaden pipes.  
1850-'94.—The Thames water was conveyed into London by leaden pipes.

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MEMORANDA AND DIARY.

## OCTOBER 28.

JAMES COOK.

- b. *October 28, 1728.*      d. *February 14, 1779.*  
English navigator. Circumnavigated the globe. He discovered and named New Caledonia and in 1776 commanded an expedition to find a northwest passage by way of Behring Strait. He reached latitude 65°. In January, 1778, he discovered the Sandwich Islands, Hawaii and Maui; in 1779 on the return voyage at Hawaii a chief was accidentally killed and Cook and a number of his party were slain.

*Is there a man, that, from some lofty steep,  
Views in his wide survey the boundless deep,  
When its vast waters, lined with sun and shade,  
Wave beyond wave in serric'd distance fade  
To the pale sky;—or views it, dimly seen,  
The shifting screens of drifted mist between,  
As the huge cloud dilates its sable form,  
When grandly curtain'd by the approaching storm,  
Who feels not his awed soul with wonder rise  
To Ham whose power created sea and skies,  
Mountains and deserts, giving to the sight  
The wonders of the day and of the night?*  
—Christopher Columbus; JOANNA BAILLIE.

- 1446.—The Portuguese discovered the West Coast of Africa.  
1460.—Juan Ponce de Leon, discoverer of Florida, born.  
In 1521, he died.  
1497, November 20.—Vasco de Gama made the first passage to the East Indies by rounding the Cape of Good Hope.  
1498.—Vasco de Gama discovered a passage to India. In 1524 he returned to India.

FREDERICK MAX-MULLER.

- b. *December 6, 1823.*      d. *October 28, 1900.*  
University of Leipzig, 1843.  
Great pioneer student in philology, the study of derivative language, by which he made great and wonderful historical deductions. He was one of the greatest scholars in ancient and oriental languages, especially of Sanskrit. The "Chips from a German Workshop" is his work that has been most read. His work on "The Science of Language" and his translation of the "Rig-Veda" are his most important works.

*The beginning and ending of a great literary work is as great an achievement as the foundation and completion of an empire—as worthy of record and of honor.*

—PHILLIPS BROOKS.

*Your voice, our music when you speak, we give  
To those who teach the mysteries above,  
That their persuasion we may soon believe;  
For doctrines thrive, when we our teachers love.*

—SIR W. DAVENANT.

- 516 B. C.—First public library was founded at Athens; 167 B. C., at Rome; 284 A. D., at Alexandria.  
1513—Balboa discovered the Pacific Ocean.  
1601.—Manoel Godinho De Exedia, a Portuguese, is said to have discovered Australia.  
1606, March.—The Dutch discovered Australia.

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MEMORANDA AND DIARY.

# OCTOBER 29.

PIERRE EUGENE MARCELLIN BERTHOLLET.

b. October 29, 1827.

d.

French chemist. He distinguished himself in the annals of mechanic arts by indicating the use of chlorine for dyeing. He also discovered acetylene an inflammable gas, about 1862.

*In boyhood dreams my Fancy loved to look  
Within the spirit-haunted cells of old,  
Where great magicians dealt with things unknown;  
Black liquors, crooked flasks, and frightful skulls,  
Of Wisdom spake, that dared the realms of Fear;—  
Or, in laboratories richly built,  
Where princes vied with plodding penury,  
To tear the secret heart of nature out.*

—*Love's Alchemy*; H. W. PARKER.

*I love it not, the crowded, murky town,  
Yet there are treasures, which I fain would seize;  
And Learning there extends her laurel crown—  
Though crowns I reck not, nor her bald degrees—  
Baudies designed the shallow mind to please.  
But much I long to sit at Learning's feet,  
And drink her drafts of knowledge to the lees.  
For this farewell each wild and calm retreat,  
And welcome smoke and dust, the foul and noisy street.*

—*Alwyn*; JAMES C. MOFFAT.

1886.—Edmund Davy discovered calcium-carbide; in 1862 Wöhler of Göttingen and Berthelot of Paris obtained it in minute quantities; in 1892 it was accidentally discovered by Thomas L. Wilson in smelting for metallurgical purposes. Henri Moissan of Paris announced its discovery about the same time. Acetylene gas is prepared commercially from it. 1902.—Ethyl-Alcohol is said to have been produced commercially from acetylene in France.

GEORGE E. WARING.

b. July 4, 1833.

d. October 29, 1898.

American sanitary engineer. He was one of the engineers of the Central Park, New York, 1857-'61. In 1880, he executed the new sewerage works of Memphis, Tennessee. In 1895, he was appointed street commissioner of New York, where he established an efficient system of street cleaning. In 1898 he went to Havana to eradicate the causes of yellow fever and he himself became a victim of the disease. Among his books are "Elements of Agriculture" (1854), "Sanitary Drainage" (1875) and "Village Improvements and Farm Villages" (1877).

*Call your light legions, tread the swampy heath,  
Pierce with sharp spades the tremulous peat beneath;  
With colters bright the rusty sward bisect,  
And in new veins the gushing rills direct;—  
So flowers shall rise in purple light array'd,  
And blossom'd orchards stretch their silver shade;  
Admiring globes their amber ears unfold,  
And Labour sleep amid the waving gold.*

—*Botanic Garden*; DR. DARWIN.

1812, October 19.—Julius Walker Adams was born. He was a hydraulic, sanitary and railroad engineer. He established the Brooklyn system of sewers, 1856, and in 1860 was engineer of the New Haven (Conn.) water-works. He was the projector of the East River Suspension Bridge.

1870-'76.—Garbage disposal plants were first erected and put in operation in Great Britain. 1887, first plant in the U. S. built at Des Moines, Iowa.



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## OCTOBER 30.

ORMSBY MACKENIGHT MITCHEL.

b. July 28, 1809.

American astronomer. In 1848 he invented a chronograph for automatically measuring and recording right ascensions by an electro-magnetic mechanism; in 1849, an apparatus for the accurate measurement of large differences of declination which was attached to the equatorial in 1854. He discovered the duplicity of certain stars and made observations of nebulae, solar spots, double stars and comets. He determined the longitude of Cincinnati and invented an apparatus for finding personal equations. His works include "The Planetary and Stellar Worlds" (New York, 1848); "The Orbs of Heaven" (1851); and "The Astronomy of the Bible" (1863).

*The heavens themselves, the planets, and this center,  
Observe degree, priority, and place,  
Insisture, course, proportion, season, form,  
Office, and custom, in all line of order.*

—Troilus and Cressida: SHAKESPEARE.

*From some superior point (where, who can tell?  
Suffice it, 'tis a point where gods reside)  
How shall the stronger man's illumin'd eye,  
In the vast ocean of unbounded space,  
Behold an infinite of floating worlds  
Divide the crystal waves of ether pure,  
In endless voyage, without port? The least  
Of these disseminated orbs, how great?*

—Night Thoughts: YOUNG.

ZADOCK PRATT.

b. October 30, 1790.

American manufacturer. When a boy he invented a pump which is still in use. In 1824 he built the largest tannery in the world around which grew the present town of Prattsville, N. Y. The post-office in Washington was erected according to his plans. He was one of the earliest advocates of a Pacific railroad.

*I cannot play upon any stringed instrument;  
but I can tell you how of a little village to make a  
great and glorious city.*

—THEMISTOCLES.

*Of iron and glass erect the crowning dome,  
That centuries, as they pass, may see man's first united home,  
And all his mighty heart playing its happy part  
Before the ages still to come! 'tis well  
Obeyed is the Law, children shall tell  
Their children's children what they saw.*

—Ode on the Great Exhibition of 1850.

Leather was known in Egypt and Greece and the thongs of manufactured hides were used for ropes, harness, etc., by all ancient nations. They understood the art of tanning it. 1788, October 23.—A leathern cannon was proved at Edinburgh and found to answer.

1633.—Shoes as at present worn were introduced.

1765-1813, January 25.—François René Curadan lived. He improved the processes of tanning leather, of making soap and of making beet sugar. He also invented stoves.

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## OCTOBER 31.

WILLEBROD SNELL.

b. 1591.

d. October 31, 1626.

Dutch mathematician. He discovered the law of the refraction of light, that the sines of the angles of incidence and refraction have to each other a constant ratio. He published "Cyclometricus" (1621) a treatise on the measurement of a circle.

*In these days, untaptly, the news of battle is familiar to us, but every shock and every charge is an application or misapplication of the mechanical force of the sun. He blows the trumpet, he urges the projectile, he bursts the bomb. And remember, this is not poetry, but rigid mechanical truth. He rears, as I have said, the whole vegetable world, and through it the animal; the tilles of the field are his workmanship, the verdure of the meadows and the cattle upon a thousand hills.*

—The Sun: JOHN TYNDALL.

600 B. C.—Jupiter was known as a planet and inserted in a chart of the heavens, in which 1,460 stars are accurately described.

1201.—Astronomy was studied by the Moors and by them brought to Europe.

1577.—Leeuwenhoek proposed the undulatory theory of light and the law of double refraction.

1590.—The microscope was invented by Zacharias Jansen or Zanse at Middleburg (1621), or by Drebbel.

1624.—Willebrod Snell discovered the law of refraction.

1861.—The spectrum analysis was applied to astronomy.

ADOLF VON BAEYER.

b. October 31, 1835.

d.

German chemist. He has acquired fame by his work in organic chemistry, above all by his researches on the action of the aldehydes, which led him to the discovery of a green coloring matter, coraleine; a red coloring matter, eosine, and to the discovery of indol, the base of indigo.

*Then first carnations learn'd to speak,  
And blies unto life were brought;  
While, mantling on the maiden's cheek,  
Young roses kindled into thought.  
Then hyacinths their darkest dyes  
Upon the locks of Beauty threw;  
And violets, transform'd to eyes,  
Inshrin'd a soul within their blue.*

—THOMAS MOORE.

925.—The first dyers' guild was established.

1581.—The indigo used in Europe first came from the East Indies. It was first mentioned in English statutes, and was first procured in Mexico.

1681.—Nitric ether was discovered by Kunkel.

1747.—The cultivation of indigo was begun in Carolina.

1756.—The secret of making India ink was brought to Goettingen by a Dutch supercargo.

1786.—Oxymuriatic was first used as a black agency.

Dahl discovered a means of preserving the colors painted on glass.

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MEMORANDA AND DIARY.

# NOVEMBER 1.

## BENOIT FOURNEYRON.

- b. *November 1, 1802.* *d. July 1867.*  
 French engineer. Celebrated for his improvements in the "turbine," or whirlpool water-wheel. Turbines of a rude construction have been used since a very remote period and their first inventor is unknown.

*Not distant far below, a mill  
 Was built upon a neighb'ring rill;  
 Whose pent-up stream, whenever let loose,  
 Impell'd a wheel, close at its base,  
 So strongly, that by friction's power,  
 'T would grind the firmest grain to flour.  
 Or, by a correspondence new,  
 With hammers, and their clatt'ring crew,  
 Would so bestir her active humps,  
 On iron blocks, with arrant lumps,  
 That in a trice she'd manage matters,  
 To make 'em all as smooth as platters.  
 Or sit a bar to rods quite taper,  
 With as much ease as you'd cut paper.  
 For, though the lever gave the blow,  
 Yet it was lifted from below.*

—Labor and Genius: RICHARD JAGO.  
*There is room enough in human life to crowd  
 almost every art and science in it. . . . The  
 more we do, the more we can do; the more busy  
 we are, the more leisure we have; and it is an old  
 maxim—"He hath no leisure who useth it not."  
 —Leisure Hours: HAZLITT.*

70 B. C.—Mithridates, King of Cappadocia, invented and set up the first corn mill driven by water.

## GEORG AGRICOLA.

- b. *March 24, 1490.* *d. November 1, 1555.*  
 German mineralogist. He became well versed in metallurgy and the art of mining. He discovered bismuth in 1530. Cuvier said, "He was to mineralogy what Gesner was to zoölogy." His principal works are; "Concerning Ores" (1546) and "On the Origin and Causes of Subterranean Things."

*How nitrous Gas, from iron ingots driven,  
 Drinks with red lips the purest breath of heaven;  
 How, white Conferva, from its tender hair,  
 Gives in bright bubbles empyrean air,  
 The crystal floods phlogistic ores calcine,  
 And the pure ether marries with the Mine.*

—Botanic Garden; DR. DARWIN.

1613.—Simon Sturtevant obtained a patent for smelting iron with bituminous coal.

1751 or 1754.—Axil Frederick Cronstadt discovered nickel.

1783.—Henry Cort patented the process of puddling.

1787, September 5—1832, December 10.—Francois Sulpice Beudant lived. In 1818 he studied the minerals of Hungary. He published "Researches on the Causes which Determine Variations of Crystalline Forms of the same Mineral Substance," (1818) and an "Elementary Treatise on Mineralogy" (2d ed., 1831).

1829.—Nelson introduced hot-blast in blast furnace.

1830.—Nils Gabriel Sefstrom discovered the metal Vanadium.

1891, February 8.—Tin ore was found in Mexico.

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## NOVEMBER 2.

THOMAS ANDERSON.

b. 1819.

d. November 2, 1874. Scottish organic and agricultural chemist. His earliest researches were on a new mineral species and on the atomic weight of nitrogen. He conducted an elaborate inquiry into "The Products of the Destructive Distillation of Animal Substances," and discovered a new pyridine series and certain fatty amines. He examined the action of sulphur on fixed oils and obtained a new, definite organic sulphide. He wrote on the Platino-pyridine Bases, and on the Polymerisation of Pyridine and Picoline.

*If you seek for strange things you shall find them,  
But the finding shall bring you to grief;  
The dead lock the portals behind them,  
And he who breaks through is a thief.  
The soul with such ill-gotten plunder  
With its premature knowledge oppressed,  
Shall grope in unsatisfied wonder  
Away by the shores of unrest.*

—Unrest: ELLA WHEELER WILCOX.

1660, October 21-1734, May 14.—George Ernest Stahl lived. He invented the theory of "phlogiston," and held that every muscular action proceeds from an impulse of the mind. He founded the animistic school of medicine, and wrote 250 medical works.

1832.—William Crookes, English physician and chemist was born. 1861.—His method of producing extreme vacua. 1861.—Discovered the metal thallium. 1865.—Crookes discovered the sodium amalgamation process for separating gold and silver from their ores.

JAMES E. EMERSON.

b. November 2, 1823.

d.

American machinist. Invented a machine for boring, turning and cutting the heads on spools or bobbins used in factories; also a combined anvil, shears and punching machine (1866), and a swage for spreading saw-teeth to a uniform width and shape and cutting the edge at a single operation.

*Where, by ruddy flames,  
Valcan's strong sons with nervous arms around  
The steady anvil and the glaring mass,  
Clatters their heavy hammers down by turn,  
Flattening the steel; from their rough hands receive  
The sharpened instruments.—The Fleece; JOHN DYER.*

*Fling wide the grain, for those who throw  
The clanking shuttle to and fro,  
In the long row of humming rooms,  
And into ponderous masses wind  
The web, that, from a thousand looms,  
Comes forth to clothe mankind.*

—W. C. BRYANT.

1870, July.—Aury G. Coes patented a machine for the manufacture of screw-wrenches for forging heads of wrenches called the header, and in 1871, April, what is called the "up-setter."

1793, August 3-1869, October 15.—John Nesmith lived. He invented a machine for making wire fences.

1832-1870, May 4.—Zerah Colburn lived. In 1847 he was a mechanic in Lowell's machine-shop. He made improvements in locomotives, and published valuable papers, among them works on "Iron Bridges" and "American Locomotives and Rolling Stock."



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MEMORANDA AND DIARY.

## NOVEMBER 3.

SIR JOHN LESLIE.

b. April 16, 1766.

d. November 3, 1832.

St. Andrew's and Edinburgh Universities.

Scottish physicist. He was the inventor of the differential thermometer, by which he was greatly aided in his researches concerning the nature of heat; he also invented the hygrometer which led to his discovery of the process of artificial freezing. He wrote "An Essay on the Nature and Propagation of Heat"; "Elements of Geometry"; and "Philosophy of Arithmetic."

*As the barometer foretells the storm*

*While still the skies are clear, the weather warm  
So something in us, as old age draws near,  
Betrays the pressure of the atmosphere.*

*The nimble mercury, ere we are aware,*

*Descends the elastic ladder of the air;*

*The telltale blood in artery and vein*

*Sinks from its higher levels in the brain;*

*Whatever poet, orator, or sage*

*May say of it, old age is still old age.*

*It is the waning, not the crescent moon,*

*The dusk of evening, not the blaze of noon:*

*It is not strength, but weakness; not desire,*

*But its surcease; not the fierce heat of fire,*

*The burning and consuming element.*

*But that of ashes and of embers spent,*

*In which some living sparks we still discern,*

*Enough to warm, but not enough to burn.*

—HENRY W. LONGFELLOW.

287-212 B. C.—Archimedes discovered the principle of displacement and specific gravity.

HIPPARCHUS.

Flourished from 160-125 B. C.

A native of Nicæa and lived at Rhodes. The Father of Astronomy and Geography. He first numbered and catalogued the stars; he discovered the precession of the equinoxes, and transferred latitude and longitude from heaven to earth, 140 B. C. He determined the revolutions and mean motions of the planets; invented the stereographical mode of projection and various instruments. He invented trigonometry, both plane and spherical. He deserves to be honored as the founder of geography and astronomy, and as a genius of the same order as Archimedes and Newton. His Commentary on the Phenomena of Aratus is extant.

*He, who through vast immensity can pierce,*

*See worlds on worlds compose one universe,*

*Observe how system into system runs,*

*What other planets circle other suns,*

*What varied being peoples every star,*

*May tell why heaven has made us as we are.*

*But of this frame, the bearings and the ties,*

*The strong connexions, nice dependancies,*

*Gradacons just, has thy pervading soul*

*Look'd through? Or, can a part contain the whole?*

*Is the great chain, that draws all to agree,*

*And draws supports, upheld by God, or thee?*

—Essay on Man: POPE.

*Skill'd in the globe and sphere, he gravely stands,*

*And, with his compass, measures seas and lands,*

—Sixth Satire of Juvenal: DRYDEN.

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MEMORANDA AND DIARY.

# NOVEMBER 4.

GEORGE FREDERICK SHAVER.

b. November 4, 1855.

d.

American inventor of an improved mechanical telephone. The features of his telephone are the means of carrying the line around curves and the way in which it is fastened to the diaphragm. His other devices include a self-righting and self-bailing life-boat, a compound automatic mail-catcher, a dynamophone to enable deaf persons to hear, a typewriter and an automatic screw-driver.

*I have a new typ-e Writer, Andd it is my de:ight  
To patter on it gail Y and wr lte, and write\$  
It aidds mE in my laborr\$9 when I ym in WorkiNG vein,  
It makes A GR EAt improvEmen&—i write So veRY pLain.*

*It o Perates sosal Fil Ys\* that when yOu find you're sTuck ; )  
and Canno T fNd the letter justfiab— and trus T to luck\$ ; )  
It's Easy— — V Ery eaSy— —to ope R Ate it then ; ; \$ 6 & / 0  
Now where on earth's that colon—\*\*\* Give me my ink and pen !*

1852.—The tubular life-boat, the Challenger, was patented.  
1878.—Boxer's life-saving, rope-carrying rocket for communicating with stranded vessels was described.

1801, March 12.—Joseph Francis was born. He invented life-saving appliances, consisting of life-boats, life-cars and surf life-boats. In 1838 he invented the life-car by which to land people safely from a wreck ; in 1842 the corrugated metallic life-car with space for four adults. He made great improvements in the hydraulic press.

THOMAS GODFREY.

b. 1704. d. December 1749.

American inventor of the quadrant, 1730, an instrument for measuring angles by two reflectors on two arms jointed. The Royal Society decided that Hadley and Godfrey were independent inventors of the quadrant. Godfrey was a profound student of mathematics, though a glazier by trade.

*How would you long to find yourself once more  
Where the great waves go rolling up and down !  
And the loud winds that spur their steaming flanks  
The sailors buffet and their voices drown !*

*How would you wonder if the honest hand  
That held you sunward on the heaving main  
Had quite forgot the trick it knew of old,  
And never so would manage you again !*

—To a Quadrant : JOHN W. CHADWICK.

1602.—Just Byng invented the measuring compass.  
1608.—William Barlowe invented the compass-box and hanging compass.

1795, April 7.—The meter was made the legal unit of length and the base of the metric system in France. It is one ten millionth part of the distance between the poles and equal to 3.2808 English feet.

1847.—Belanger gave the name of *impulse* to the expression of living power (kinetic energy) to  $\frac{mv^2}{2}$  pt.

1879.—Hopkins introduced graphical representations of indicator curves in dynamo and engine tests.

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MEMORANDA AND DIARY.

## NOVEMBER 5.

JOHN FLACK WINSLOW.

b. *November 5, 1810.*

American manufacturer. In 1833 he produced pig-iron and in 1837 controlled the Albany & Rensselaer iron-works, one of the largest producers of railroad and other iron in the U. S. His firm built the "Monitor" which was begun in October, 1861, at Greenpoint, Long Island; launched January 30, 1862, and delivered to the government March 5, 1862. He was president of the company constructing the Poughkeepsie Bridge over the Hudson River.

*The workman here, with busy hand,  
The fire both late and early fanned.  
The sparks fly out, the bellows ply,  
As of the rock to liquify.  
The fire and water's might twofold  
Are here united found;  
The mill-wheel, by the flood seized hold,  
In whirling round and round;  
The works are clattering night and day,  
With measured stroke the hammers play,  
And yielding to the mighty blows,  
The very iron plastic grows.*

—Friedrich: SCHILLER.

1543.—Ralph Page and Peter Baude made cast-iron in Sussex.

1558.—The blast-furnace was introduced into England from Belgium.

1767.—Cast-iron rails substituted wood on railroads in England.

ROBERT MALLET.

b. *June 3, 1810.*

British engineer and seismologist. He raised and sustained the roof of St. George's Church, Dublin. In 1836 he built swivel bridges over the Shannon, and 1845-1848 many terminal railway stations, engine sheds and workshops, beside the Nore viaduct. The Fastnet Rock lighthouse was built by him in 1848-49. He is well known as the inventor of the buckle-plate, patented 1852. These plates form a good flooring.

*Earthquakes, Nature's agonizing pangs,  
Oft shake the astonish'd isles; the Solfaterra  
Or sends forth thick, blue, suffocating steams,  
Or shoots to temporary flames.  
Can the poor brittle tenements of man  
Withstand the dread convulsion! Their dear homes  
Which shaking, tottering, crashing, bursting, fall.  
The mountain waves, passing their custom'd bounds,  
Make direful loud incursions on the land,  
All overwhelming; sudden they retreat,  
With their whole troubled waters; but anon  
Sudden return, with louder, mightier force;  
The black rocks whiten the vast shores resound;  
And yet, more rapid, distant they retire  
—Eruption of Volcano in Sea, near Azores;  
GRAINGER.*

234 B. C.—The first lighthouse was the Pharos, built at Alexandria.

1750.—An earthquake occurred at London.

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MEMORANDA AND DIARY.

## NOVEMBER 6.

JAMES GREGORY.

b. November 6, 1638. d. October , 1675.

Scotch philosopher and mathematician. He invented the refracting telescope and his mathematical discoveries placed him in the first rank of philosophers. He published at the age of 24 "Optica Promota," (1663), a description of a reflecting telescope; his invention dated from 1661. He solved by infinite series the Keplerian problem of drawing tangents to curves geometrically, and devised a rule for the direct and inverse method of tangents. On June 15, 1668, he gave an "Account of a Controversy betwixt Stephano de Angelis and John Baptist Riccioli" respecting the motion of the earth. He was a professor in the University of Edinburgh.

*Thou hast the secret strange  
To read that hidden book, the human heart;  
Thou hast the ready writer's practis'd art;  
Thou hast the thought to range  
The broadest circle intellect hath ran—  
And thou art God's best work—an honest man.*  
—WILLIS.

600 B. C.—Miletus divided the earth into five climatic zones, introducing the equator and meridians and made a rough measurement of the inclination of the equator to the ecliptic.

276-195 B. C.—Eratosthenes lived, and made measurements of the lengths of the sun's shadow at Alexandria and at the first cataract of the Nile and thus calculated the earth's circumference at about 25,000 miles.

1200.—The Moors introduced astronomy into Europe.

GAIL BORDEN.

b. November 6, 1801. d. January 11, 1874.

American inventor and surveyor. He established the first newspaper in Texas. His attention being attracted to the need of more suitable food supplies for emigrants and travelers across the plains, he produced a "meat biscuit." He next invented a process of condensing milk and in 1856 obtained a patent on it. He produced an extract of beef of superior quality, also extracts of condensed tea, coffee and cocoa. In 1862 he patented a process for reducing the juices of fruits to one-seventh their original bulk.

*What is ambition? 'Tis a glorious cheat!  
It follows not with fortune. It is seen  
Rarely or never in the rich man's hall.  
It seeks the chamber of the gifted boy,  
And lifts his humble window and comes in.  
The narrow walls expand, and spread away  
Into a kingly palace, and the roof  
Lifts to the sky, and unseem fingers work  
The ceiling with rich blazonry, and write  
His name in burning letters over all.*  
—Ambition; WILLIS.

1500.—Cocoa was unknown in Europe until the discovery of America.

1865.—Introduction in this country of deep and cold setting of milk.

1882.—Ensilage, a system of preserving corn and green fodder for cattle in pits made air and water tight, came into practice.



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## NOVEMBER 7.

JEAN ANDRE DE LUC.

- b. 1726. *d. November 7, 1817.*  
 Swiss chemist and geologist. His chief works are "Letters on the Origin and Formation of the Earth," "Elements of Geology" and "Geological Travels in the North of Europe, England, France, Switzerland and Germany."

*With all the sons of reason scatter'd wide  
 Through habitable space, wherever born,  
 Home'er endow'd! To live, free citizens  
 Of universal nature! to lay hold  
 By more than feeble faith on the Supreme!  
 To call heav'n's rich unathomable mines  
 (Mines which support archangels in their state)  
 Our own! to rise in science, as in bliss,  
 Initiate in the secrets of the skies!  
 To read creation; read its mighty plan  
 In the bare bosom of the Deity!  
 The plan, and execution, to collate!  
 To see, before each glance of piercing thought,  
 All cloud, all shadow, blown remote; and leave  
 No mystery.*

—*Night Thoughts*; YOUNG.

1755, November 1.—An earthquake at Lisbon threw down the greater part of the city in six minutes and caused the death of 60,000 people.

1854.—An earthquake at Japan caused a sea wave 30 feet in height to travel 370 miles per hour.

1883.—Krakatoe, a volcano in Sunda Straits, exploded and caused an earthquake. Where land formerly existed there was afterward 900 feet of water.

JEAN GABRIEL AUGUSTIN CHEVALLIER.

- b. 1778. *d.* 1848.  
 French engineer and optician. He produced a mechanical barometer and made areometers of great perfection. He gave to the public the double opera glasses, produced the isocentric glasses, invented numerous eye-glasses, a new pancreatic microscope and an alembic for testing the quality of wine; he also invented the optic scale.

*Who formed the curious organ of the eye,  
 And cloth'd it with its various tunics,  
 Of texture exquisite; with crystal juice  
 Supplied it, to transmit the rays of light;  
 Then plac'd it in its station eminent,  
 Well fence'd and guarded, as a sentinel  
 To watch abroad, and needful caution give?  
 —NEEDLER.*

1370.—Spectacles were invented.

1500.—Leonardo da Vinci noticed the difference of vision with each eye, and Francis Aquilonius, in 1613, made it the subject of a treatise.

1640.—Athanasius Kircher invented the magic lantern.

1807.—Dr. Wollaston invented a camera lucida.

1838.—The first factory in the United States for making gold spectacles and silver thimbles was started at Long Meadow, Mass.

1851.—Helmholtz invented the ophthalmoscope, an apparatus for inspecting the interior of the eye.

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MEMORANDA AND DIARY.

## NOVEMBER 8.

EDMUND HALLEY.

b. *November 8, 1656. d. January 14, 1742.*

English astronomer. He invented means of observing eclipses, improved the sextant, and on November 7, 1677, made the first complete observation of a transit of Mercury. He demonstrated in 1686 the relation of elevation to the density of the atmosphere and applied it to barometrical readings; he materially improved diving apparatus, experimented on the dilation of liquids by heat, and by his scientific voyages laid the foundation of physical geography. His discovery of the long inequality of Jupiter and Saturn; of the acceleration of the mean motion of the moon; his prediction of the return of the comet which bears his name; his researches in terrestrial magnetism; his suggestions regarding the determination of the sun's parallax, and his meteorological, mathematical, optical and statistical researches evince a universality of talent of rare occurrence.

*And many a point, at distance dimly view'd,  
For idle toilers and unmeasured height,  
By persevering energy subdued,  
Rewards the bold adventurer with a sight  
Of undiscover'd worlds—vast regions of delight.  
—The Pursuit of Learning.*  
JOHN HERMAN MERVILLE.

1610.—Jupiter's satellites were discovered.

THOMAS BEWICK.

b. *August 12, 1753. d. November 8, 1828.*

Englishman who revived the art of engraving on wood in 1775. His best work was his "History of British Birds," 1804. He illustrated Goldsmith's "The Traveller" and "The Deserted Village," the "Fables of Æsop," and other works.

*The eternal Master found  
His single talent well employ'd.*

—SAMUEL JOHNSON.

*He whose grasp is sure, whose step is firm,  
Whose brain is constant—he makes one proud rock  
The means to scale another, till he stand  
Triumphant on the peak.*  
—AVOINDRANE.

1460.—Wood engraving was invented.

1460.—Printing in dyes was invented.

1490.—Chiaroscuro engraving was first practiced.

1789.—Wood engraving was greatly improved by Bewick, his brother and his pupils.

1820.—Color-printing was invented.

1823.—Color-printing with metal plates in book-binding was employed by Congreve.

1843.—C. Pul, of Copenhagen, invented the chemotype, a process of etching a zinc plate for printing.

1848.—Chromolithography, method of printing from stone in colors, was introduced.

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MEMORANDA AND DIARY.

## NOVEMBER 9.

BENJAMIN BANNEKER.

b. November 9, 1731.

d. October 1806.

American negro mathematician. He prepared and published almanacs for Maryland and the adjoining States. Assisted Ellicott in surveying the site of Washington and the boundaries of the District of Columbia.

*It isn't the thing you are doing,  
But the way that you do it, my friend;  
Not the course, but the way of pursuing,  
On which your successes depend.  
There are prizes in every vocation,  
And he is the fortunate man  
Who frets not, because of his station,  
But does just the best that he can.  
—True Worth Wins; LILLIE SHELDON.*

*In this theatre of man's life, it is reserved only  
for God and angels to be lookers-on.*—PYTHAGORAS.

3761 B. C.—The era of the Jews begins.

3101 B. C. (or 3348)—The Hindu era begins.

45 B. C.—The Roman year is again corrected by Julius Cæsar; he makes it 365 $\frac{1}{4}$  days.

27 B. C., February 14.—The Augustan era begins, 727 years after the foundation of Rome.

1 A. D., January 1.—The Christian era commences with the traditional date of the birth of Christ (4 (?) B. C.).

632, June 26.—The beginning of the Yezdegerd, or Persian era, with the election of King Yezdegerd III. (Formerly of universal use in Persia, and now used by the Parsees in India.)

PAUL JABLOCHKOFF.

b.

d.

French electrician. Inventor of an auto-accumulator cell remarkable for its small size, light weight, low cost, and freedom from deleterious fumes, and an atmospheric battery consisting of a small rod of sodium in contact with an amalgamated copper wire, wrapped in paper and secured to a plate of porous carbon. No liquid was used. In 1876 he introduced the "electric candle" which bears his name. It consisted of two carbon rods fixed parallel a slight distance apart, with an insulating material between which was consumed at the same rate as the carbons themselves.

*Education is not confined to books alone. The  
world with its thousand interests and occupations  
is a great school. The recorded experience and  
wisdom of others may be of the greatest aid and  
benefit to us. We can look about us to-day and see  
many who have brought the light of that intelli-  
gence which has been the guiding-star of others to  
bear upon their own paths, and by its aid have  
achieved an enviable position among men. Honor  
lies in doing well whatever we find to do; and the  
world estimates a man's abilities in accordance  
with his success in whatever business or profession  
he may engage.*

—B. F. TROWBRIDGE.

1878, March 28.—Electric light was tried at Westminster Palace, London.

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MEMORANDA AND DIARY.

## NOVEMBER 10.

DAVID M. SMITH.

b. 1809.

d. November 10, 1881.

American inventor. In 1832 he patented "awls on the haft." The awl-haft as made by him was similar to the Aiken awl. In 1849 he patented a combination lock and improved the first lathe dog. He invented a peg-splitting machine, two sewing-machines and a patent clothes-pin. In 1860 he devised machinery to make spring hooks and eyes. He received letters patent for sixty inventions, including one for folding newspapers.

*The wise ones tell us that it is intellect that has done it. And all honor to intellect! It is not I, nor you, fellow-workers, who will attempt to rob the royal power of intellect of one iota of his renown. Intellect is also a glorious gift of the Divinity,—a divine principle on the earth. We set intellect at the head of labor, and bid it lead the way to all wonders and discoveries; but we know that intellect cannot go alone. Intellect cannot separate itself from labor.*

—The True Dignity of Labor: WILLIAM HOWITT.

1563.—The manufacture of pins was begun in England.

1695.—John Lofting, from Holland, established the manufacture of thimbles at Islington, London.

1790.—Thomas Saint patented a machine for sewing boots and shoes.

1816.—Odlon invented a machine for making cut nails.

1841.—Walter Hunt invented a double reciprocating nail engine which cut 600 ten-penny nails a minute.

AMOS EMERSON DOLBEAR.

b. November 10, 1837.

d.

American physicist. In 1867 he invented and perfected an electric gyroscope, used to demonstrate the rotation of the earth; in 1872 he used tuning-forks to exhibit Lissajou's curves and the opetidoscope for the exhibition of the vocal vibrations; in 1876 he perfected and patented his magnetoelectric telephone, and in 1879 the static telephone. He published "The Art of Projecting" (1876); "The Speaking Telephone" (1877); and "Sound and Its Phenomena" (1885).

*Come in, To-Day, come in!  
I have confess'd my sin*

*To thee, young promise-bearer!*

*New Lord of Earth!*

*I hail thy birth—*

*The crown awaits the wearer.*

*Child of the ages past!*

*Sire of a mightier line!*

*On the same deeps our lot is cast;*

*The world is thine—and mine!*

—The Lost Day: MACKAY.

*All the inventions that the world contains,  
Were not by reason first found out, nor brains;  
But pass for theirs who had the luck to light  
Upon them by mistake or oversight.*

—BUTLER.

1747.—Creed projected a machine having an object similar to that of the phonograph.



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MEMORANDA AND DIARY.

## NOVEMBER 11.

MARIE FRANÇOIS XAVIER BICHAT.

b. November 11, 1771.

d. July 22, 1802.

French physiologist and anatomist. He developed new and important ideas on the anatomy of the tissues and on the distinction between organic and animal functions in his "Treatise on the Membranes" (1798), in "Researches on Life and Death" (1800) and in "General Anatomy Applied to Physiology and Medicine" (1801). He was the first to reduce the organs of the body to their elementary tissues, and explained the chemical, physical and vital properties of each primitive tissue; also the first to recognize the importance of the distinction between organic and animal functions and to make it the basis of a classification.

*He who binds  
His soul to knowledge, seals the key of heaven—  
But 'tis a bitter mockery that the fruit  
May hang within the reach, and when, with thirst  
Wrought to maddening phrenzy, he would taste—  
It burns his lips to ashes.*

—WILLIS.

300 B. C.—Dissection, previously confined to animals, was first applied to men by Herophilus and Erasistratus.

1537.—The dissection of the human body was performed by Vesalius.

1620.—Bone-setting was first scientifically practiced.

1718.—Jean Louis Petit invented the screw tourniquet for suppressing the flow of blood in surgical operations.

LOUIS BERTRAND CASTEL.

b. November 11, 1668.

d. January 11, 1757.

A Jesuit; eminent as a mathematician and philosopher. His principal works are "A Treatise on Universal Gravity"; "Universal Mathematics." He was the inventor of an instrument called the Ocular Harpsichord, intended to affect the eye by colors in the same manner that the ear is affected by sound.

*But in his silent chamber the thoughtful sage is projecting  
Magical circles, and steals e'en on the spirit that forms,  
Proves the force of the matter, the hatred and loves of the  
magnet,  
Follows the tune through the air, follows through ether the  
ray,  
Seeks the familiar law in chance's miracles dreaded,  
Looks for the never-changing pole in the phenomena's flight.*  
—The Walk; SCHILLER.

*There's music in all things, if men had ears  
[eyes].*

—BYRON.

*Musik requires, indeed, a code of rules just as  
poesy requires a system of versification.*

—THIBAUT.

1686.—Newton published his "Philosophiæ Naturalis Principia Mathematica," describing his theories of force, action and reaction; his conception of mass; his explanation of gravity, and his formulation of the principles of the parallelogram of forces.

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MEMORANDA AND DIARY.

## NOVEMBER 12.

JEAN FRANÇOIS CLOUET.

b. *November 11, 1751.*

d. *June 4, 1801.*

French chemist and mathematician. France is indebted to him for having perfected the manufacture of cast steel and for an imitation of Damascus scimitar blades.

*It may be averred that as certainly as the age of iron superseded that of bronze, so will the age of steel reign triumphant over iron.*

—HENRY BESSEMER.

*Jubal : he was the father of all such as handle the harp and organ. And Zillah, she also bare Tubal-cain, an instructor of every artificer in brass and iron.*

—Genesis, Chapter IV.

640 B. C.—Phœbus of Samos invented the art of casting statues in iron and bronze.

1515.—Tyrol. The rolling machine was invented by Hall.

1740.—Benjamin Huntsman set up a manufactory for cast steel at Handsworth, near Sheffield.

1800.—The manufacture of shear-steel began in Sheffield.

1867, November (about).—John Heaton's process for making steel was announced.

1867.—Montefiore-Levi and Kunzel invented an alloy of copper, tin and phosphorus known as phosphor-bronze.

1876.—Manganese bronze, a new metal, was produced by P. M. Parsons, inventor of white brass.

HENRY ECKFORD.

b. *March 12, 1775.*

d. *November 12, 1832.*

Scotch-American shipbuilder. Made important improvements in the building of ships; built the "Robert Fulton" the first successful ocean-going steamboat, and during the war of 1812 he constructed a fleet of warships for Lake Erie in a remarkable short time.

*That holds, in spite o' knock an' scale, o' friction, waste an' slip,  
An' by that light-now, mark my words we'll build the perfect Ship.*

*I'll never last to judge her lines to take her curve—not I.*

*But I ha' lived an' I ha' worked. All thanks to Thee, Most High!*

*An' I ha' done what I ha' done—judge thou if ill or well—  
Always they Grace preventin' me . . . Losh! Yon's the "Stand by" bell.*

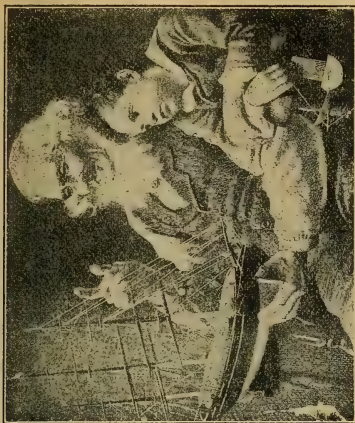
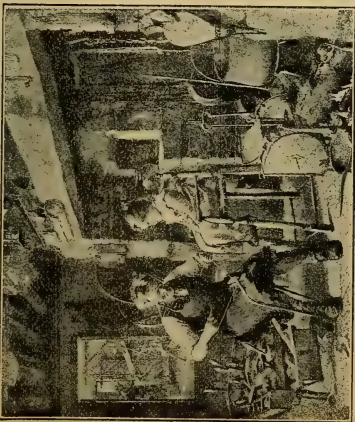
*Pilot so soon! His flare it is. The mornin' watch is set.  
Well, God be thanked, as I was saying! I'm no Pelagian yet.*

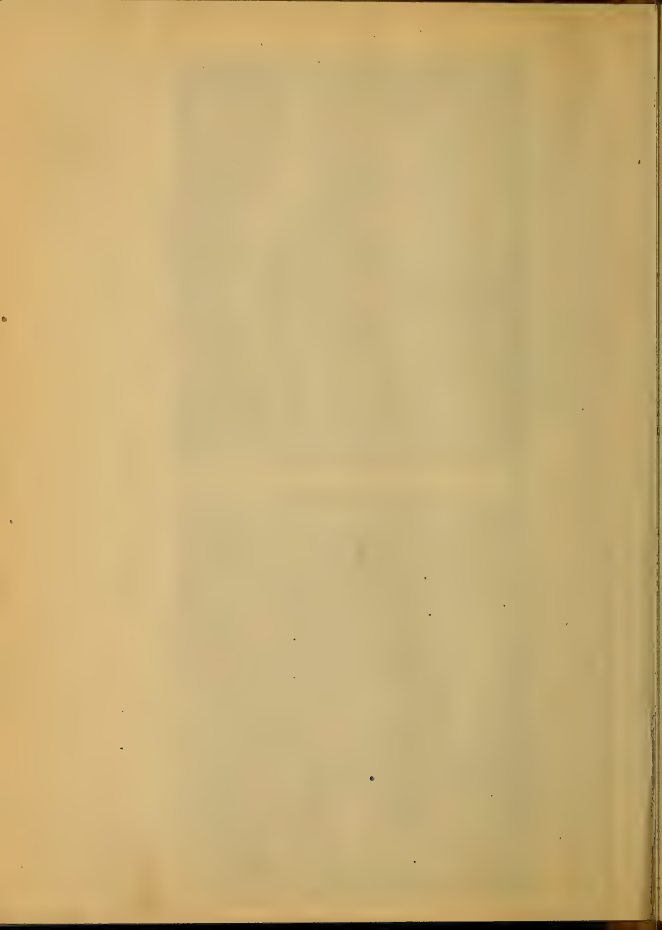
—The Seven Seas: RUDYARD KIPLING.

*If the invention of the Ship was thought so noble,  
which carrieth riches and commodities from place  
to place, and consocieth the most remote regions  
in participation of their fruits, how much more are  
letters to be magnified, which, as Ships, pass through  
the vast Seas of time, and make ages so distant to  
participate of the wisdom, illuminations, and in-  
ventions, the one of the other!*

—On the Proficiency and Advancement  
of Learning: BACON.

1783.—Ships were first copper-bottomed.





1904.

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SATURDAY.

1904.

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MEMORANDA AND DIARY.

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## . NOVEMBER 13.

ALFRED MARSHALL MAYER.

b. *November 13, 1836.*

d.

American physicist. He showed that the translation of a vibrating body caused it to emit waves differing in length from those produced by the same vibrating body when stationary; he devised a method of detecting the phases of vibration in the air surrounding a sounding body, leading to his invention of the topophone; a mode of measuring the wave lengths and velocities of sound in gases, resulting in the invention of an acoustic pyrometer; a method of determining the relative intensities of sound; five new methods of sonorous analysis for the decomposition of a compound sound into its elementary tones; the determination of the laws of vibration of tuning-forks.

*Oh, birth, oh, death of Time!  
Oh, mystery sublime!  
Ever the rippling ocean  
Brings forth the wave  
To smile or rave,  
And die of its own motion.  
A little wave to strike  
The sad, responsive shore,  
And be succeeded by its like,  
Ever and evermore.*

—The Lost Day: MACKAY.

1877, December.—Edison announced a phonograph.

1880.—Audiphone invented by R. G. Rhodes.

JOHN ADOLPH DAHLGREEN.

b. *November 13, 1809.*

d. *July 12, 1870.*

American naval officer. Designed the style of cannon known by his name; also invented a rifled cannon and introduced boat-howitzers with iron carriages. He published many scientific works on ordnance which have been used as text-books in the navy.

*Hail, adamantine Steel! magnetic Lord!  
King of the prow, the plowshare, and the sword!  
True to the pole, by thee the pilot guides  
His steady helm amid the strugling tides,  
Braves with broad sail the immeasurable sea,  
Cleaves the dark air, and asks no star but thee.—  
O'er restless realms when scouting Discord flings  
Her snakes, and loud the din of battle rings;  
Expiring strength, and vanquish'd Courage feel  
Thy arm resistless, adamantine Steel!*

—Botanic Garden: DR. DARWIN.

1543.—Bombs and mortars were invented.

1685.—The early English guns were first made of brass; in 1847 they were made of iron.

1804, October 5—1877, December 24.—Robert Parker Parrott lived. He devised and perfected the system of rifled cannon and projectiles known by his name. These were first put to the test of actual warfare in the Battle of Bull Run.

1824.—A steam-gun was invented by Perkins.

1831, December 15.—Needle-gun was patented.

1842.—The artillery carbine was introduced.

1861, July 1.—Steel guns were first manufactured at Trenton.



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MEMORANDA AND DIARY.

## NOVEMBER 14.

RENE JOACHIM HENRI DUTROCHET.

*b. November 14, 1776. d. February 4, 1847.*

French naturalist and physicist. In 1826 he published his discovery of the flow of the sap in plants, *i. e.*, "endosmosis." He has published a series of essays on physiology, among which are "Observations on the Structure of Feathers" (1819) and "Researches in Endosmosis and Exosmosis" (1828).

*Through desolate gorges dirges of despair,  
It drove the snow-flakes slanting down the air,  
And piled the drifts of snow;*

*Or whether it breathed soft in vernal hours,  
And filled the trees with sap, and filled the grass with flowers.*

—*Cajetan Nature Triumphant*; R. H. STODDARD.

*Know ye how opens out the seed, and how the plant upgrows,  
How, soft and green in sweet springtide, 'tis ripe ere summer's  
close?*

*How, in the downy covert of the swift-winged swallow's nest,  
Instinct to mother-love expands in the gentle creature's breast;  
And how, beneath the shelter of the fragile, ovate shell,  
A winged germ takes life one day to quit its narrow cell?*

—FRED DESCHAMPS.

1697, November 23—1705, January 17.—John Ray lived. He was the father of natural history in England. In 1683 he published "Methodus Planatarum Nova," in which he first showed the true nature of buds and indicated many of the natural orders now employed by botanists. This was the first decided step towards a natural system of classification. He left a complete classification of insects and a less complete "history" of the group. This is the first classification of animals that can be reckoned both general and grounded in nature.

SIR CHARLES LYELL.

*b. November 14, 1797. d. February 22, 1875.*

Exeter College, Oxford, B. A., 1819; M. A., 1821.

English geologist. He divided the tertiary period into eocene, miocene and pliocene, which has met with world-wide acceptance. In 1838 he published "Elements of Geology" and in 1871 a virtually new work, "The Student's Elements of Geology." For years this was the only good text book on geology.

*On heavenly ground they stood; and, from the shore  
They viewed the vast, immeasurable abyss,  
Outragious as a sea, dark, wasteful, wild,  
Up from the bottom, turned by furious winds  
And surging waves, as mountains, to assault  
Heaven's height, and with the centre mix the pole.*

—*Raphael's Account of Creation*; MILTON.

All the means of action—

*The shapeless masses—the materials—  
Lie everywhere about us. What we need  
Is the celestial fire to change the flint  
Into transparent crystal, bright and clear.*

—*The Spanish Student*; LONGFELLOW.

2349 B. C., December 7.—The Noachian deluge began in Armenia. It continued 377 days (Blair).

2348 B. C., May 6.—Noah's ark rested on one of the mountains of Ararat. December 18 Noah and family left the ark (Blair).

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MEMORANDA AND DIARY.

# NOVEMBER 15.

SIR WILLIAM HERSCHEL.

b. November 15, 1738.

d. August 25, 1822.

German astronomer in England. In 1781 he discovered a new world which he named Georgian Star, but generally called Herschel or Uranus, March 13, 1781. Afterwards he discovered six moons, belonging to his new planet. His largest telescope was forty feet long, erected at Slough and ready for use August 28, 1789. He was the virtual founder of sidereal science. He discovered more than eight hundred double stars, measuring their "angles of position" by means of his "revolving wire micrometer," and their angular distances apart with his "lamp micrometer." In 1774 he first saw Saturn through a five-foot reflecting telescope made by his own hands. As an astronomer he was surpassed by no one of the age; and the depth of his scientific researches and the extent of his observations rendered him, perhaps, second only to the immortal Newton. He was also a musician and in 1766 he was an organist at Halifax.

"So, late descy'd by Herschel's piercing sight,  
Hang the bright squadrons of the twinkling Night;  
Ten thousand marsh'd stars, a silver zone,  
Effuse their blended lustres round her throne;  
Suns call to suns, in lucid clouds conspire,  
And light exterior skies with golden fire;  
Resistless rolls the illimitable sphere,  
And one great circle forms the unmeasured year.  
—Botanic Garden: DR. DARWIN.

REINHARD MANNESMANN.

b. November 15, 1814.

d.

1894.

German inventor. Discoverer of the Mannesmann process for rolling seamless steel tubes. By this process a hot steel billet is passed between two conical rolls set with their axes at a small angle to each other. The billet comes out as a tube with uniform walls, without the use of a mandril or anything else to make the central opening. The bicycle trade creates a great demand for Mannesmann tubes. The inventor and his brothers were leading makers of files in Germany. The former made special research into the nature of crucible steel. He was one of the first to suggest the electro-magnetic separation of ores.

*He gathered all the tools of Ages; instruments shaped by his  
elders—  
Mediums of ancient sages, alchemists and iron-welders;  
Gathered them and reared a tower—blocks of Science, pile  
stupendous,  
Apex dizzy tremendous—dazzling spire of Truth and  
Power!  
The giant's dying, but it shall be said by progeny of Time, He  
is not dead!*

—WILL S. REYNOLDS.

1790.—Wilkinson patented a process of drawing leaden pipe through dies.

1797, March 12.—Jean Denis Gandillot was born. He brought into use in France a method of welding square or round tubes of sheet-iron.

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MEMORANDA AND DIARY.

# NOVEMBER 16.

JEAN LE ROND D'ALEMBERT.

b. November 16, 1717.

d. October 29, 1783.

French geometer and philosopher. In 1743 he published a "Treatise on Dynamics," containing an important principle which is known by his name and which initiated a revolution in physico-mathematical sciences. He wrote "Researches on Various Important Points of the System of the Universe" (1754-'56) and "Elements of Philosophy" (1759).

*The world's a bubble, and the life of man*

*Less than a span;*

*In his conception wretched, from the womb,*

*So to the tomb;*

*Curs'd from the cradle, and brought up to years,*

*With cares and fears; trust,*

*Who then to frail mortality shall trust,*

*But times the water, or but writes in dust.*

—BACON.

Let not him that putteth his hand to the plough look backwards;  
Though the ploughshare cut through the flowers of life to its  
fountains.

—The Courtship of Miles Standish: LONGFELLOW.

*Man has plumb'd these veiled realms,*

*The boundaries of the possible have been extended,*

*A mortal, armed with the eye of a giant,*

*Has been enabled to see the gleams of light*

*Confines of empty space!*

J. J. AMPERE.

1743.—D'Alembert published his principle of the equilibrium of forces, called D'Alembert's principle.

1829.—Gauss enunciated his law of least constraint which may be deduced from D'Alembert's principle.

EUDOXUS.

Lived about 370 B. C.

Greek astronomer. Pliny informed us that he determined the length of the year at  $365\frac{1}{4}$  days. He is also said to have originated the doctrine of the concentric solid crystalline spheres, by which the apparent motions of the sun, the moon and the planets were explained. His works are not extant.

*What a solemn and striking admonition to youth is that inscribed on the dial at All Souls, Oxford—  
perit et imputatur—the hours perish and are laid to our charge: for time, like life, can never be recalled. Melancthon noted down the time lost by him that he might reanimate his industry, and not lose an hour.*

—SAMUEL SMILES.

*Every moment you now lose is so much character and advantage lost; as, on the other hand, every moment you now employ usefully, is so much time wisely laid out, at prodigious interest.*

—LORD CHESTERFIELD.

*The hours of a wise man are lengthened by his ideas, as those of a fool are by his passions. The time of the one is long, because he does not know what to do with it; so is that of the other, because he distinguishes every moment of it with useful or amusing thoughts; or, in other words, because the one is always wishing it away, and the other always enjoying it.*

—ADDISON.

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MEMORANDA AND DIARY.

# NOVEMBER 17.

SETH BOYDEN.

b. *November 17, 1788.*

American inventor. Manufacturer of nails and cut files with improved machines of his own construction. He improved the machine originally devised by his father for leather-splitting, which he adapted for the splitting of sheep-skins and thin leather for bookbinders' use. In 1819 he produced a superior article of patent leather. From 1831-'35 he manufactured malleable iron castings. He introduced the cast-iron prome or bed used in stationary steam-engines and substituted the straight axle in place of the crank in locomotives. His most important invention was the cut-off in place of the throttle valve and he connected the same with the governor. He also invented a "hat-body doming machine."

*Keep upon the anvil ringing  
Stroke of hammer; on the gloom  
Set 'twixt cradle and 'twixt tomb  
Shower of fiery sparkles flinging;  
Keep the mighty furnace glowing;  
Keep the red ore hissing, flowing  
Swift within the ready mould;  
See that each one than the old  
Still be fitter still be fairer  
For the servant's use, and rarer  
For the master to behold.*

—*Work Away.*

1093 B. C.—Files were used in Judea.

JAMES FERGUSON.

b. 1710.

d. *November 17, 1776.*

Scottish mechanician and astronomer. Without assistance he discovered the fundamental principles of the lever and the wheel and axle. While serving as a shepherd he made himself master of astronomy and constructed models of mills, spinning wheels and at length framed a pair of globes and a watch. He supported himself for several years by being a miniature painter. Among his works are "Astronomy Explained," "Lectures on Mechanics, Hydrostatics, etc.," "The Art of Drawing in Perspective" and "An Introduction to Electricity."

*The untied forces of the air, the earth, the sea,  
Wait at thy bidding; oh, compel their powers  
To uses holy! Let them ever be  
Servants to tend and bless these new-found bowers,  
And make them household-workers, free and swift,  
On daily use—on daily service bent;  
Her face again old Eden may uplift,  
And God look down the open firmament.*

—*The Mechanic; CORNELIUS MATHEWS.*

610 B. C.—547 B. C., Anaximander lived. He was the founder of the Ionic sect. He is said to have discovered the obliquity of the ecliptic, fixed the epoch of the equinoxes and solstices and in 562 B. C. invented the sphere and the gnomon. He taught that the earth revolved and that the sun was a globe of fire as large as the earth and that there was an infinite number of worlds. He was a reputed inventor of maps and estimated the circumference of the globe at 400,000 stadia.

The gnomon was invented to measure altitudes in 812 B. C.



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MEMORANDA AND DIARY.

## NOVEMBER 18.

SIR WILLIAM SIEMENS.

b. April 4, 1823.

d. November 18, 1883.

English inventor, metallurgist and electrician. With his brother, Werner, he made improvements in electric plating and in the solutions used for gilding and silvering. A chronometric governor for steam engines was devised by Werner and worked out by William and the process of "anastatic printing" was developed by them. The regenerative steam engine and condenser was mainly the invention of William. In 1851 William produced a water meter, and, with Frederick Siemens, he invented the regenerative furnace which was applied to the manufacture of steel. William was one of the first to suggest the transmission of power by electricity. In 1879 he also invented an electric furnace, a bathometer, and with his brother, Werner, he built the Indo-European telegraph in 1868-'69.

*Iron vessels cross the ocean, iron engines give them motion;  
Iron needles northward veering, iron tillers vessels steering;  
Iron pipe our gas delivers, iron bridges span our rivers;  
Iron pens are used for writing, iron ink our thoughts inditing;  
Iron stoves for cooking victuals, iron ovens, pots and kettles;  
Iron horses draw our loads, iron rails compose our roads;  
Iron anchors hold in sands, iron bolts, and rods, and bands;  
Iron houses, iron walls, iron cannon, iron balls;  
Iron axes, knives and chains, iron augers, saws and planes;  
Iron globules in our blood, iron particles in food;  
Iron lightning-rods on spires, iron telegraphic wires;  
Iron hammers, nails, and screws—iron everything we use.*

ASA GRAY.

b. November 18, 1810.

d.

American botanist. From 1842-1873 he was Professor at Harvard. With Dr. John Torrey, he classified species on the natural basis of affinity. In 1874 he was Regent of the Smithsonian Institute. From 1863-'73 he was President of the Amer. Acad. of Arts and Sciences, and in 1872 of the Amer. Assn. for the Adv. of Science.

*Lo! on each seed, within its slender rind,  
Life's golden threads in endless circles wind;  
Maze within maze the lucid webs are rolled,  
And as they burst, the living flame unfold.  
The pulpy acorn, ere it swells, contains  
The oak's vast branches in its milky veins,  
Each raveled bud, fine flim, and fiber-line,  
Traced with nice pencil on the small design,  
The young Narcissus, in its bulb compressed,  
Cradles a second nestling on its breast,  
In whose fine arms a younger embryo lies,  
Folds its thin leaves, and shuts its forest-eyes;  
Grain within grain, successive harvests dwell,  
And boundless forests slumber in a shell.*

*See'st thou yon fern and tree, the herb, the flower,  
Have they not life as thine, and health and power?  
Do they not breathe, and eat, and drink, to be?  
Something they have in common, man, with thee.  
Watch their emotion when the cold north wind  
Blows on the flowers; do they not try to find  
Some shelter 'neath their leaves? Then bow their heads  
Away from hurrying winds. But if instead  
Of cold the beneficent sun should shine,  
How glad all nature grows!—JOHN P. MORRIS.*

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FRIDAY.

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MEMORANDA AND DIARY.

## NOVEMBER 19.

GEORGE W. MANBY.

b. 1765. d. November 18, 1854.

British officer. About 1808 he invented a mode of saving life by shooting from a mortar a rope to mariners shipwrecked near the coast.

*Mournful wave! I deemed thy song  
Was telling of a mournful prison,*

*Which, when tempests swept along,*

*And the mighty winds were risen,*

*Foundered in the ocean's grasp,*

*While the brave and fair were dying.*

*Wave! didst mark a white hand clasp*

*In thy folds as thou wert flying?*

—A Dying Wave: ANONYMOUS.

*Throw out the Life-line across the dark wave,*

*There is a brother whom some one should save;*

*Somebody's brother! oh, who then will dare*

*To throw out the Life-line, his perils to share?*

*Throw out the Life-line with hand quick and strong:*

*Why do you tarry, my brother, so long?*

*See! he is sinking; oh, hasten to-day—*

*And out with the Life-boat! away, then, away.*

—E. S. UFFORD.

1802.—Life-boats first invented.

1819, June 20.—First American steamer at Liverpool was launched.

1821.—First seagoing steam vessel, made of iron, was constructed in England.

1830.—First iron steamship was built in the United States.

FERDINAND DE LESSEPS.

b. November 19, 1805. d. December 8, 1894.

French engineer of the Suez Canal, which was inaugurated November 17, 1869. The canal for steamboats of light draught was opened on August 15, 1865. Since 1878 he concentrated his energy on the Panama Canal. The scandal attending the exposure of the Panama Canal mismanagement is supposed to have hastened his death.

*Where the demands for competent ability are so pressing and the temptations to employ that ability in such occupations as bring them instant rewards are so great, it is quite certain that but few will be found inclined to spend their lives in studies which have no interest for others, and no perceptible bearing on private or public good.*

1847, July 8.—The canal from Durana to Marseilles was completed.

1854.—The Ganges Canal in India was opened.

1859.—The construction of the Suez Canal was begun.

1861.—The canal of Languedoc (Canal du Midi), connecting the Atlantic with the Mediterranean, 148 miles long, was completed.

1864.—The Suez Canal was completed.

1865.—A canal was dug connecting Amsterdam with the North Sea. (1876, November 1, opened.)

1869, November 23.—The Suez Canal was formally opened to the commerce of the world in the presence of the Emperor of Austria, the Empress of France and the Khedive of Egypt.

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MEMORANDA AND DIARY.

# NOVEMBER 20.

GEORGE GRAHAM.

b. 1675.

d. November 20, 1751.

English mathematician and watchmaker. Gave to various movements for measuring time a degree of perfection which had never before been attained; and also invented several astronomical instruments; he effected great improvements in those which had been in use before. He composed the whole known planetary system within the compass of a small cabinet, from which, as a model, all modern orreries have been constructed. He constructed the most complete planetarium known at the time. He invented the ingenious mercurial pendulum and the "dead-beat escapement."

*Well has His work the mighty Maker made*

*In mechanism wonderful in man,*

*And all the parts by many members played*

*So harmonized into a common plan,*

*So blended soul and body into one,*

*That all the healthful frame with soul imbued,*

*Glorying in existence, its brief span*

*A full condensed millennium of good,*

*Bounds with exultant joy—impulsive gratitude.*

—ALWYN; JAMES C. MOFFATT.

1639, November 24.—The first transit of Venus over the face of the sun was observed by the Rev. Jeremiah Horrox, or Horrocks, and his friend, William Crabtree, as predicted by Horrox in 1633.

1670.—The orrery was invented.

HENRY DRAPER.

b. March 7, 1837.

d. November 20, 1882.

American physicist. He made a specialty of celestial photography. His most celebrated photograph is that of the moon, and it probably gives the best representation of its surface thus made. In 1873 the finest photograph of the diffraction spectrum ever made was taken by him. Some experiments led him to assume the presence of oxygen in the sun, and in July, 1877, he announced "The Discovery of Oxygen in the Sun by Photography and a New Theory of the Solar Spectrum." This investigation culminated in perhaps the most original discovery ever made in physical science by an American.

*Tell me, ye splendid orbs! as from your throne*

*Ye mark the rolling provinces that own*

*How formed, what beings fill those bright abodes?*

*Their happiness, how gifted? What their powers, their state,*

*The stamp of human nature? Or has God*

*Peopled those purer realms with lovelier forms*

*And more celestial minds? Does Innocence*

*Still wear her native and untainted bloom?*

*Speak, speak! the mysteries of those living worlds*

*Unfold! No language? Everlasting light*

*And everlasting silence? Yet the eye*

*May read and understand. The hand of God*

*Has written legibly what man may know,*

*The Glory of the Maker.*

—Address to the Heavenly Bodies: HENRY WARE, JR.

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MEMORANDA AND DIARY.

## NOVEMBER 21.

GARDNER CHILSON.

- b. 1804. d. November 21, 1877.  
American inventor and manufacturer of stoves and furnaces. Among his inventions are conical radiators, applied to stoves, 1854, a cooking-range with two ovens placed above the fire and arranged so that either may be used (1858) and an office stove surmounted with a broad disk, which radiates heat toward the floor (1865).

*Lo! where the chimney's sooty tribe ascends,  
The fair Trochaid from the corner bends,  
Her coal-black eyes upturn'd incessant mark  
The eddying smoke, quick flame, and volant spark;  
Mark with swift ken, where flashing in between,  
Her much-lov'd smoke-jack glimmers thro' the scene;  
Mark how his various parts together tend,  
Point to one purpose, in one object end.*

1200.—Chimneys were first introduced in England, but were confined to kitchen and large hall.

1200.—Fire grates first used. The hearths of the early Britons were fixed in the centre of their halls. The fire-place originally was perhaps a large stone depressed below the level of the ground to receive the ashes. Chafing dishes were in use until the introduction of chimneys.

1325.—Stoves were first used.

1444.—Smoke-jacks were in use, and in 1571 Bartolomeo Scappi, cook to Pope Pius V., described them in his cook-book.

1747.—Col. William Cook's method of heating by steam pipes was described in the Gentleman's Magazine, p. 171.

ELIZUR WRIGHT.

- b. February 12, 1804. d. November 21, 1885.

American mathematician and inventor. 1853-1858 he edited the Railroad Times and invented and constructed a spike-making machine, a water-faucet and an improved pipe-coupling. He evolved a new formula for finding the values of policies of various terms, known as the "accumulation formula," and invented and patented (1869) the arithmeter, a mechanical contrivance for arithmetical operations based on logarithms. He published several works on practical insurance.

*The chiefest action, for a man of spirit  
Is never to be out of action; we should think  
The soul was never put into the body,  
Which has so many rare and curious pieces  
Of mathematical motion, to stand still.*

—Devil's Law Case; WEBSTER.

500-1150.—The Hindus invented a process of casting out nines and they were familiar with the rule of three, with computation of interest with allegation and arithmetical and geometrical series.

1299.—The Florentine merchants were forbidden the use of Hindu numerals in bookkeeping and either to use the Roman numerals or to write the numbers in words.

1501-1576.—Jerome Cardan lived. He was a believer in astrology and pretended to have calculated his own death. He published "Ars Magna," which was remarkable for the age and in which were some of Tartaglia's rules.



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MEMORANDA AND DIARY.

## NOVEMBER 22.

GEORGE WASHINGTON GALE FERRIS.

- b. *February* 4, 1859. *d. November* 22, 1896.  
American engineer. He worked as a civil engineer in West Virginia and Kentucky. He conceived the idea of building the gigantic revolving wheel known by his name, which was a conspicuous figure at the Columbian Exposition in Chicago, in 1893.

*I'll build it so, that if the blast  
Around it whistle loud and long,  
The tempest when its rage has pass'd  
Shall leave its columns doubly strong.  
I'll build it so, that travelers by  
Shall view it with admiring eye,  
For its commodiousness and grace;  
Up from the ground—straight to the sky—  
A view of earth, from God's dwelling place.  
—Adapted from The Building of the House; MACKAY.*

The largest pyramid, Ghizeh, is 461 feet high; the Sphinx, near to it, 100 feet; the Colossus of Rhodes was 106 feet; the Ferris Wheel, 264 feet; the Eiffel Tower of the Paris Exposition, 984 feet; the Washington Monument, 555 feet in height. The last was designed by Robert Mills and built by Lieut.-Colonel T. L. Casey. The highest building in New York, the Park Row Syndicate, is 332 feet high.

1871, June.—The Tay Bridge was begun in Scotland; May 31, 1878, it was opened; length, 10,610 feet; consisted of 85 spans, some 90 feet above water level; cost \$350,000; about 20 lives lost during its construction.

1889, March 31.—Eiffel Tower in the Champ de Mars, Paris, was completed. 984 feet high; 7,000 tons iron used; cost over \$1,000,000.

FRANCOIS LE VAILLANT.

- b. 1753. *d. November* 22, 1824.  
French naturalist. In 1780 he explored South Africa, extending his researches northward beyond the Orange River. He remained in Africa till July, 1784, and made a large collection of African birds. He published a "Natural History of the Birds of Africa" (1796-1812).

*Nor these alone possess the lenient power  
Of soothing life in the desponding hour.  
Some favorite studies, some delightful care,  
The mind with trouble and distresses share;  
When of some pleasing, fancy good possessed,  
Each grew alert, was busy, and was blessed.  
Whether the call-bird yield the hour's delight,  
Or—magnified in microscope—the mite;  
Or whether tumbler, croppers, carriers seize  
The gentle mind, they rule it and they please.  
—REV. GEORGE CRABBE.*

*Mark it all, within, without!  
No tool had he that wrought,  
No nail to fix, no bodkin to insert,  
No glue to join; his little beak was all;  
And yet how neatly finished! What nice hand,  
With every implement and means of art,  
Could make me such another?*

—A Bird's Nest; J. HURDIS.

1722, May 11—1789, April 7.—Pieter Camper lived. He filled successively the chairs of philosophy, anatomy and medicine at Amsterdam and Groningen. In 1771 he discovered the presence of air in the bones of birds. Among his works are "Anatomico-Pathological Demonstrations" (1760-1763) and "The Sense of Hearing in Fishes."

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MEMORANDA AND DIARY.

## NOVEMBER 23.

EDMUND BLUNT.

b. *November 23, 1799.* d. *September 2, 1866.*

American hydrographer. He made the first accurate survey of New York Harbor; in 1819-'20 the first survey of the Bahama banks and the shoals of George and Nantucket, and in 1824 he surveyed the entrance of New York Harbor from Barnegat to Fire Island. In 1825-'26 he ran levels from the river San Juan to the Pacific Ocean for a canal on the Nicaragua route. In 1855-'56 he determined the exterior lines of New York Harbor. He advocated Fresnel's system of signal lights and invented the dividing-engine.

*Who, that surveys this span of earth we press,  
This spect of life in time's great wilderness,  
This narrow isthmus 'twixt two boundless seas,  
The past, the future, two eternities!  
Would sultry the bright spot or leave it bare,  
When he might build him a proud temple there,  
A name, that long shall hallow all its space,  
And be each purer soul's high resting-place!*  
—Lalla Rookh; MOORE.

*If you have great talents, industry will improve them; if moderate abilities, industry will supply their deficiencies. Nothing is denied to well-directed labor; nothing is ever to be attained without it.*  
—SIR J. REYNOLDS.

1799, November 4.—Ralph Gout secured a patent on the pedometer, an instrument for numbering the steps taken by a walker.

JOHN WALLIS.

b. *November 23, 1616.* d. *October 8, 1703.*

English mathematician and clergyman. He had consummate skill in the art of deciphering and was one of the first to give power of communication to the deaf and dumb. His mathematical works form three volumes; the principles of analogy and continuity were introduced by him into mathematical science. His interpretation of negative exponents and unrestricted employment of fractional exponents greatly widened the range of higher algebra. Finally he invented the symbol for infinity,  $\infty$ .

*Whoso with patient and inquiring mind  
Would seek the stream of science to ascend,  
Must count the cost, and never hope to find  
Rest to his feet, or to his wanderings end.  
The faithless road doth ever onward tend,  
And clouds and darkness are its utmost bound.  
The sacred fount no human eye hath kenn'd,  
Though many a wight, beguiled by sight or sound,  
"Eopenza!" may exclaim, "I—I the place have found."  
—The Pursuit of Knowledge; JOHN H. MERIVALE.*

1505.—Scipio Ferro solved cubic equations of the form of  $x^3 + mx = n$ .

1541.—Tartaglia discovered general solution of cubic equations.

1545.—Lodovico Ferrari solved equations of the fourth degree.

1596-1650.—Rene Descartes interpreted negative quantities and their systematic use.

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MEMORANDA AND DIARY.

## NOVEMBER 24.

EMILE LAMM.

*b. November 24, 1834.* *d. July 12, 1873.*  
 French inventor. In 1869 he devised an am-  
 moniacal fireless engine for the propulsion of street  
 cars. The motor has not been adopted in the United  
 States but in France and Germany it is extensively  
 used for street cars and vehicles. He patented  
 another fireless engine in 1872 which is now in  
 practical use; also a process for the manufacture of  
 sponge gold, which product is used largely by den-  
 tists throughout the United States.

*The spirit of Paley's maxim, that "he alone  
 discovers who probes," is applicable to the history  
 of inventions and discoveries; for certainly he  
 alone invents to any good purpose who satisfies the  
 world that the means he may have devised have  
 been found competent to the end proposed.*

—DR. SAMUEL BROWN.

1791.—John Barber patented his gas engine, using hydro-  
 carbon gas.

1794.—Robert Street patented his explosive engine, using  
 turpentine.

1803.—Sir George Cayley invented the first known air en-  
 gine; in 1807 a hot-air engine.

1825.—Mr. Brown, of London, patented his pneumatic or  
 gas-vacuum engine.

1833.—Ericsson obtained a patent for his calorific engine, and  
 a subsequent patent for improvements was taken out in 1851  
 and another in 1856.

1868, October.—John Ericsson announced a device for ob-  
 taining motive power by condensing rays of sun.

DAVID STANHOPE BATES.

*b. June 10, 1777.* *d. November 24, 1839.*

American engineer. In 1818-1824 he was an engi-  
 neer of the Erie Canal; the first aqueduct at  
 Rochester was designed and superintended by him;  
 1825-1829 he was engineer of the canal system of  
 Ohio and chief engineer of the Louisville and Port-  
 land Canal; in 1829 he was chief engineer of the  
 surveys and location of the Chenango Canal from  
 Utica to Binghamton; in 1830 was commissioned to  
 survey the Genesee Valley Canal and in 1834 made  
 surveys for the Erie and Kalamazoo Railroad in  
 Michigan.

*Things of the noblest kind his genius drew,  
 And look'd a thorough nature at a single view;  
 A loose he gave to his unbounded soul.*

*And taught new lands to rise, new seas to roll;*

*Call'd a into being scenes unknown before,  
 And, passing nature's bounds, was something more.*

—ROSCIAI: CHURCHILL.

*Suppose they did construct substantial works of  
 masonry. The Cloaca maxima attests it. But  
 what, think you, would a Roman engineer have  
 said of putting a seven-mile bore, entirely through  
 an Alpine barrier of solid rock, and of taking  
 Pompey's legions through it beneath the avalanche,  
 from flank to flank, as quick as he could swallow a  
 dish of Lucrine oysters?*

1808, February 4.—Canals first acted upon in New York.

1817.—Construction of Erie Canal was begun.

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MEMORANDA AND DIARY.

## NOVEMBER 25.

ANDREW CARNEGIE.

b. November 25, 1835.

d.

American manufacturer. He was one of the first to read telegraphic signals by sound. Associated with others, he established a rolling mill and from this has grown the most extensive and complete system of steel and iron industries ever controlled by an individual. He is a frequent contributor to periodicals on the labor question. He wrote "Triumphant Democracy; or, Fifty Years' March of the Republic" (1886). He has given enormous sums to the founding of public libraries throughout the United States and Great Britain, and has contributed largely to educational institutions.

*For just experience tells, in ev'ry soil,  
That those who think must govern those that toil;  
And all that Freedom's highest aims can reach  
Is but to lay proportion'd loads on each.*

— Traveller: GOLDSMITH.

*Kings are said to have long arms, but every man  
should have long arms, and should pluck his living,  
his instruments, his power and his knowing, from  
the sun, moon and stars. Is not then the demand  
to be rich legitimate? Yet, I have never seen a rich  
man. I have never seen a man as rich as all men  
ought to be, or with an adequate command of  
nature.*

— Wealth: EMERSON.

His own suggestion of an appropriate epitaph for his tomb is: "Here lies a man who knew how to get around him much cleverer men than himself."

LEWIS MORRIS RUTHERFORD.

b. November 25, 1816.

d.

American physicist. He discovered the use of the star-spectroscope to show the exact state of achromatic correction in an object glass, particularly for the rays used in photography. He constructed a micrometer for the measurement of astronomical photographs, for use upon pictures of solar eclipses or transits, and upon groups of stars. His photographs of the moon have not been surpassed. He constructed a ruling engine in 1870 that produced interference-gratings on glass and speculum metal.

*What is glory? What is fame?  
The echo of a long-lost name;  
A breath; an idle hour's brief talk;  
The shadow of an arrant naught;  
A flower that blossoms for a day,  
Dying next morrow;  
A stream that hurries on its way,  
Singing of sorrow;  
The last drop of a bottleless shower.  
Shed on a sear and leafless bower;  
A rose stuck in a dead man's breast,—  
This is the world's fame at the best!*

— WILLIAM MOTHERWELL.

1765, March 7—1833, July 5.—Joseph Nicephore Niepce lived. He first discovered the transient images of the camera-obscura. His process he termed "Heliography." He invented the "Pyreolophore" and other apparatus.



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MEMORANDA AND DIARY.

# NOVEMBER 26.

W. G. ARMSTRONG.

b. November 26, 1810. d. December 27, 1900.

English inventor of the hydro-electric machine and of the gun which bears his name. 1856 he was appointed engineer-in-chief for rifled ordnance and superintendent of the foundry at Woolwich.

*Then, towns he quickened by mechanic arts,  
And bade the fervent city glow with toil ;  
Bade social commerce raise renowned marts,  
Join land to land, and marry soil to soil ;  
Unite the poles, and without bloody spoil  
Bring home of either Ind the gorgeous stores ;  
Or, should despotic rage the world embroil,  
Bade tyrants tremble on remotest shores,  
While o'er the encircling deep Britannia's thunder roars.*

—The Castle of Indolence : THOMSON.

1330.—Guns invented ; in 1344, in use by the Moors ; in 1354, adopted by Denmark ; in 1377, in use by the Venetians, and in 1406, first used by the Spanish.

1718.—James Puckle obtained the earliest patent for repeating fire-arms in this country.

1770.—Joseph Cugnot constructed a steam automobile for artillery transport.

1880.—Percussion arms were used in the U. S. army.

1835.—Colonel Colt obtained his first patent in America ; in 1849, he made improvements in his revolver.

1847, October 29.—Henry Metcalfe was born. He invented the first detachable magazine that was used with military small arms.

1851.—Adams improved the revolver.

BENJAMIN HUNTSMAN.

b. 1704. d. 1776.

English mechanic and inventor of cast-steel. He was bred to a mechanical calling and became celebrated for his expertness in repairing clocks, in making and repairing locks, smoke-jacks, roasting-jacks and other articles requiring mechanical skill. He practiced surgery with dexterity. He introduced several improved tools but was much hindered by the inferior quality of the metal, and he then turned his attention to the making of a better kind of steel. His experiments extended over many years, and finally he invented the process of making cast-steel.

*Little thinking if we work our souls as nobly as our iron,  
Or if angels will commend us at the goal of pilgrimage.*

—MRS. BROWNING.

*Draw thy fierce streams of blinding ore,  
Smile on a thousand anvils, roar  
Down to the harbor-bars ;  
Smoulder in smoky sunsets, flare  
On rainy nights, while street and square  
Lie empty to the stars.*

*From terrace proud to alley base,  
I know thee as my mother's face.*

—GLASGOW : ALEXANDER SMITH.

*The painful smith, with force of fervent heat,  
The hardest iron soon doth moltsafe,  
That with his heavy sledge he can it beat,  
And fashion to what he it list apply.*

—SPENCER.

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MEMORANDA AND DIARY.

## NOVEMBER 27.

### ANDERS CELSIUS.

- b. *November 27, 1701.* d. *April 25, 1744.*  
 Swedish astronomer. In 1736 he was selected by the French government to assist in the measurement of the length of a degree in Lapland. He introduced in about 1742 the Centigrade or Celsius thermometer.

*I can is a hero, the first in the field;  
 Tho' others may falter he never will yield;  
 He makes the long marches, he strikes the last blow,  
 His charge is the whirlwind that scatters the foe.  
 How grandly and nobly he stands to his trust!  
 When roused at the call of a cause that is just!  
 He weds his strong will to the valor of youth,  
 And writes on his banner the watchword of truth.  
 —I Can and I Can't; MACAULAY.*

- 760.—Astronomy and geography were cultivated by the Arabs.  
 1620.—Cornelius Drebbel invented the alcohol thermometer.  
 1730.—Gabriel D. Fahrenheit invented his thermometer.  
 1731.—The pyrometer was invented by Musschenbroeck.

1895, March 12.—Simon Newcomb was born. In 1861 he was professor of mathematics in the United States Navy and assigned to the United States Navy Observatory in Washington. He purchased the 28-inch equatorial telescope, supervised its erection, and planned the tower and dome in which it is mounted. He has written many memoirs and text books on mathematical and astronomical subjects.

### HENRY AUGUSTUS ROWLAND.

- b. *November 27, 1848.* d. *April 16, 1901.*  
 American scientist. Professor at Johns Hopkins University. His principal discoveries were the magnetic action due to electrical convection, the exact determination of the mechanical equivalent of heat, the discovery of concave gratings and the machine for ruling by which the analysis of the solar spectrum was revolutionized. By his diffraction gratings, ruled by a method of his own, to 30,000 lines to the inch on concave mirrors, he produced an image of the spectrum without the aid of lenses. Photographs of the solar spectrum made with these gratings surpass anything else produced. He showed that a moving charge of static electricity caused the same magnetic effect as a current.

*Thy hand the magic sceptre holds,  
 Before which Monarchs kneel;  
 The power to unking kings, and make  
 Both thrones and empires reel.  
 For education buildeth mind,  
 Thought on thought the tower doth rise;  
 A workman thou; the architect,  
 And Master, in the skies!*  
 —*The Teacher*: ABNEY ALLIN.

1868, February.—The siderostat, an apparatus for observing the light of stars in precisely the same way as the light of the sun may be studied in the camera obscura, was constructed by Leon Foucault.

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MEMORANDA AND DIARY.

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## NOVEMBER 28.

PETER JAQUET DROZ.

b. July 28, 1721.

d. November 28, 1790.

Swiss mechanician. Among his inventions was an automaton so admirably contrived that every motion of the articulation of the hand and fingers was obvious to the eye and similar to those of nature. He gained distinction from his valuable improvements in the art of clock-making. He was the father of Henry Louis Jaquet Droz.

*They flashed upon us love's bright gem ;*

*They showed us gleams of fame ;*

*Stout-hearted work we learned from them,*

*And honor more than name.*

*And so they came, and went away ;*

*We said not go, we said not stay.*

*Well,—give the little years their way ;*

*Think, speak, and act the while ;*

*Lift up the bare front to the day,*

*And make their wrinkles smile.*

*They mould the noblest living head ;*

*They carve the best tomb for the dead.*

—*The Little Years*: ROBERT T. S. LOWELL.

1678 (about).—John Hautefeuille invented the device for regulating the vibrations of the balance wheel in watches by a spring. It was subsequently improved by Huygens.

1734, January 23.—1804, March 26.—Wolfgang de Rempelen lived. 1778 he was the custodian, if not the inventor, of the automaton chess player ; also of a speaking machine.

1776-1855, September 5 or 7.—Leonard Maelzel lived. He invented the panharmonicon and also a figure of human size and proportions representing a trumpeter.

JOHN WESLEY HYATT.

b. November 28, 1837.

d.

American inventor. In 1861 he invented a knife-grinder and a composition billiard ball ; in 1869 he discovered a process of dissolving pyroxyline under pressure, thus laying the foundation of the celluloid business. He produced the fine slate and special machinery for making it. In 1878 he discovered a new compound, consisting chiefly of bone and silica, which he called "bonsilate." He is a pioneer in water purification, and his investigations led in 1881 to the filtration of water for water systems.

*Dare to be right! dare to be true!*

*You have a work that no other can do ;*

*Do it so bravely, so kindly, so well,*

*Angels will hasten the story to tell.*

*Dare to be right! dare to be true!*

*The failings of others can never save you ;*

*Stand by your conscience, your honor, your faith,*

*Stand like a hero, and battle till death.*

*The triumph of the industrial arts will advance the cause of civilization more rapidly than its warmest advocates could have hoped, and contribute to the permanent prosperity and strength of the country far more than the most splendid victories of successful war.*

—C. BABAGE.

1841.—Thos. Ewbank published his Descriptive and Historical Account of Hydraulic and other Machines, in five books. There are many editions.

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MEMORANDA AND DIARY.

## NOVEMBER 29.

### PRINCE RUPERT.

- b. 1619. d. November 29, 1682.
- English inventor. He discovered a composition known as Prince's metal, improved gunpowder and contrived an engine for raising water. He invented a rapid-firing gun, a method of rock-blasting for mines and other subterranean places and one of making hail shot of different sizes. He devised a screw by means of which quadrant observations at sea were rendered easier and more secure and certain. He is credited with the invention of mezzotinto. He was the son of Elizabeth, the daughter of James I.

*Labor hews down the gnarled oak, and shapes the timber, and builds the ships, and guides it over the deep, plunging through the billows and wrestling with the tempest, to bear to our shores the produce of every clime. Labor, by the universally-spread ramifications of trade, distributes its own treasures from country to country, from city to city, from house to house, conveying, to the doors of all, the necessities and luxuries of life.*

—Labor: REV. NEWMAN HALL.

- 1685.—Drill holes for blasting were stopped with wooden plugs in United States, with clay in Saxony, and in 1791 sand tamping of drill holes was first used.
- 1759.—Chisel-edge drills were introduced.
- 1849, March.—J. J. Couch patented the power percussion drill in the United States.
- 1857.—Sommelier invented his percussion drill.

### PIERRE ANDRE LATREILLE.

- b. November 29, 1762. d. February 6, 1833.
- French naturalist, surnamed "The Prince of Entomology." Because of revolutionary troubles he abandoned the priesthood and devoted himself to science. He published "The Natural History of Ants" (1802); "A Memoir on the Sacred Insects of the Egyptians," and "The Genera of Crustacea and Insects, Arranged According to the Natural Order" (1806-1809).

*The flower and bird—the fish, the brute,  
Of every kind, occult or known,  
(Each exquisitely formed to suit  
Its humble lot, and that alone),  
Through ocean, earth, and air fulfil,  
Unconsciously, their Author's will,  
Who gave, without their toil or thought,  
Strength, beauty, instinct, courage, speed;  
While through the whole His pleasure wrought  
What'er His wisdom had decreed.*

—MONTGOMERY.

1707, September 7—1788, April 16.—Comte Georges Louis Leclerc de Buffon lived. By demonstrating the unity of the human species he prepared the way for Camper and Cuvier. He contributed to the philosophy of natural history the law of the geographical distribution of animals depending on climate and other physical conditions. He published "Histoire Naturelle, Generale et Particuliere."

1725.—Peyssonnel first discovered and rightfully maintained against the savants of France that the coral polypti were tiny marine animalcules and were not coral flowers, as they had previously been represented and described.



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MEMORANDA AND DIARY.

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# NOVEMBER 30.

SMITHSON TENNANT.

b. November 30, 1761.

d. February 22, 1815.

English chemist. In 1791 he demonstrated that when marble is heated with phosphorus the carbon of the fixed air which it contains is liberated. This experiment afforded the analytical proof of the composition of fixed air. In 1804 he published his discovery of two metals, osmium and iridium, which occur in crude platinum, and are left behind when the metal is dissolved in *aque regia*.

*How are ye changed ! Ye take the cataract's sound ;  
Ye take the whirlpool's fury and its might ;  
The mountain shudders as ye sweep the ground ;  
The valley woods lie prone beneath your flight.  
The clouds before you shook like eagles past ;  
The homes of men are rocking in your blast ;  
Ye lift the roofs like autumn leaves, and cast,  
Skyward, the whirling fragments out of sight.  
—The Wind. BRYANT.*

1773.—Cobalt was discovered by George Brandt.

1803.—Palladium was discovered in platinum ore by Dr. William H. Wollaston.

1819.—Eilhard Mitscherlich discovered the law of isomorphism, and in 1832 he observed dimorphism of sulphur.

1861.—Thallium was discovered by William Crookes.

1863.—Indium was discovered by Drs. Reich and Richter.

1876.—Gallium was discovered by Lecoq de Boisbaudran. Its properties had been predicted by Mendeleeff in 1870.

WILLIAM GILBERT.

1540.

d. November 30, 1603.

English physician and scientific writer. His work "On the Magnet, the Magnetic Bodies," etc. (1600), was the first great physical book published in England. It treats of the attraction of the magnet, its direction to the poles of the earth and its variation and declination, and he points out the practical bearing of these points in navigation and how the declination may be used in discovering the latitude at sea. His general conclusion is that the phenomena of magnetism are explained by regarding the earth as one vast spherical magnet.

*No man is born into the world, whose work  
Is not born with him ; there is always work,  
And tools to work withal, for those who will ;  
And blessed are the horny hands of toil !*

—LOWELL.

*Labor seizes the thought of genius, the discoveries of science, the admonition of piety, and, with its magic types impressing the vacant page, renders it pregnant with life and power, perpetuating truth to distant ages and diffusing it to all mankind. And who, contemplating such achievements, will deny that there is dignity in Labor ?*

—REV. NEWMAN HALL.

2400 B. C.—The magnet was known.

1671.—The dip of the magnetic needle was first observed. It was then 75° ; in 1885 it was 65° 18' at Paris.

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MEMORANDA AND DIARY.

# DECEMBER 1.

ASA WHITNEY.

b. December 1, 1791.

American manufacturer. He patented (May 22, 1847) the corrugated plate car-wheel and the curved corrugated plate wheel and began their manufacture with his son George as partner. On April 25, 1848, he patented his process for annealing car-wheels. The discovery of this process of annealing, as applied to chilled cast-iron wheels, marked an era in the history of railroads. On March 19, 1850, he patented the tapered and ribbed corrugated wheel.

*With a scream of the whistle our farewell said,*

*And into the blackness of night we sped*

*On and on to meet the dawn;*

*Under the sky where the stars burned red;*

*Past hills that stood where the snows were shed,*

*Ghostly white as the shrouded dead;*

*On and on to meet the dawn;*

*True hand at the throttle and hope ahead!*

*The steel rails ringing—*

*The swift wheels singing:*

*"To kith and kin, O hearts that roam—*

*In vine-wreathed cot, and marble dome,*

*Over the world we bear you home."*

*—What the Car Wheels Say: FRANK L. STANTON.*

1767.—Cast-iron plate rails were first used for tramways.

1847.—Chilling of cast-iron by bringing molten iron in contact with cold metal mold was invented.

1886.—John R. Whitney invented and patented the Whitney contracting car-wheel chill for car-wheels.

MARTIN HENRY VON KLAPROTH.

b. December 1, 1743.

d. January 1, 1817.

German professor of chemistry at Berlin. He discovered uranium, the zirconia and millic acid. He also made interesting experiments on copal and completed the discovery of tellurium and titanium. He wrote six volumes on mineralogy (1793-1815).

*And is this the prime*

*And heaven-sprung adage of the older time?*

*Say, canst thou make thyself? Learn first that trade.*

*Haply thou mayst know what thyself had made.*

*What hast thou, man, that thou dost call thine own?*

*What is there in thee, man, that can be known?*

*Dark fusion, all unfixable by thought*

*A phantom dim of past and future wrought,*

*Vain sister of the worm, life, death, soil, clod.*

*Ignore thyself, and strive to know thy God.*

*Know Thyself: S. T. COLERIDGE.*

1667.—Phosphorus was discovered by Brandt, of Hamburg.

1709.—Prussic acid was accidentally discovered by Diesbach, a chemist. It was first obtained in a separate state by Scheele.

1785.—Henry Cavendish demonstrated the nature of nitric acid.

1806.—Davy studied electrolysis; discovered sodium and potassium.

1808.—Magnesium was first obtained from magnesia by Sir Humphrey Davy.

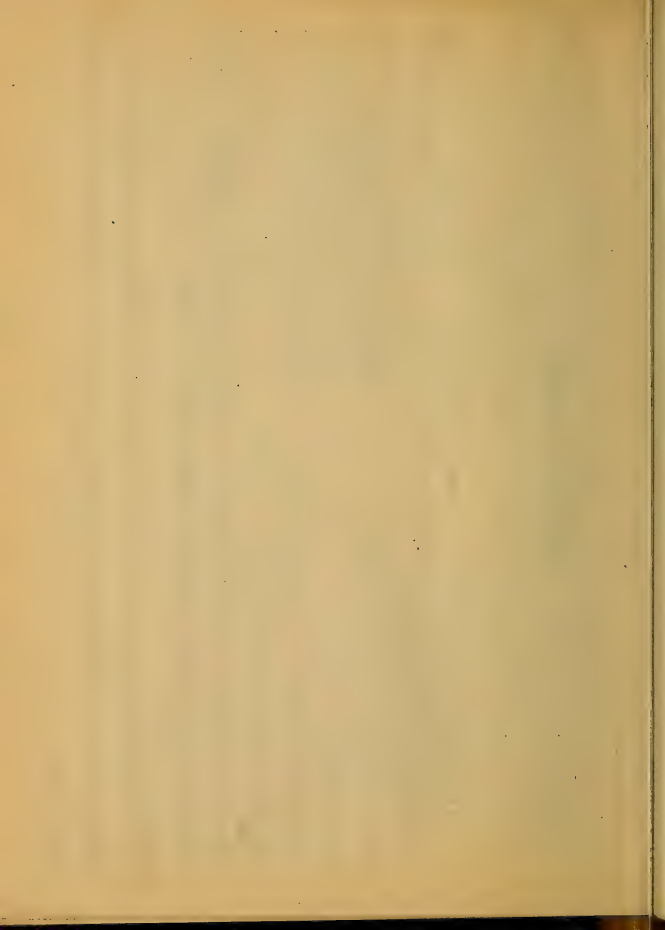
1818.—Subcarbonate of soda was employed in photography as a fixing medium by Sir John Herschel.

# NOTICE!

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The author and publisher beg to announce to the reader that this calendar will be issued for the year 1905 in new and various forms. They also announce that the calendar will be issued in special forms to meet the wants and wishes of manufacturers, transportation companies, supply men, contractors and builders, if they will make their wishes known. This was the original intention, but the work was completed so late in 1903 that it could not be issued in special form by or before the holiday trade; the other forms were therefore abandoned for 1904.

Suggestions and criticisms are respectfully invited by the author, John Cassan Wait, Attorney and Counselor at Law, 220 Broadway, The City of New York.



1904.

THURSDAY.

MEMORANDA AND DIARY.

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## DECEMBER 2.

JAMES SARGENT.

b. December 1, 1824.

d.

American inventor. In 1848 he was a traveling photographer; in 1852 he manufactured and sold an automatic apple-parer. He invented and in 1865 patented a lock that was proof against professional skill. In 1873 he invented the time locks that bear his name, which were the first successfully used in this country. He has devised various styles of his locks for special uses and has improved the original patterns.

*I would not waste my spring of youth  
In idle dalliance; I would plant rich seeds  
To blossom in my manhood, and bear fruit  
When I am old.*

—J. A. HILLHOUSE.

*Whether under some mossy roof,  
Their wedded spirits serenely blent,  
They weave the even warp and woof  
Of their quiet lives in calm content.*

—FLORENCE PREY.

The ancient Egyptians invented a lock which contained the principles of the modern tumbler-lock.

1540.—The padlock was invented by Copernicus at Bavaria.  
1540.—A padlock was invented by Beecher at Nuremberg, Bavaria.

1781.—The Bramah safety lock was invented by Joseph Bramah; patented in 1784.

SAMUEL MOORE POOK.

b. August 15, 1804.

d. December 2, 1878.

American naval constructor of the United States Navy, 1841-1866. Inventor of naval devices. He built the sloops-of-war "Preble" and "Saratoga," the frigates "Congress" and "Franklin" and the steamers "Merrimack" and "Princeton." He was the inventor of numerous devices connected with his profession, and wrote "A Method of Comparing the Lines and Draughting Vessels Propelled by Sail or Steam," with diagrams (New York, 1866).

*Across all lands, with flying smoke and fire,  
Screamed its steam-eagles; o'er the mastered wave  
Thundered its battleships; the trembling wire—  
Modern Electra's web—beneath them, gave  
Service from shore to shore, for Time and space  
Had strunk abashed before our Century's face.*

*Also it learned a master word of Life  
From Darwin's lips, and wrung from Chemistry  
Her hidden talisman to heal the strife  
Twixt body and pain, and set the sufferer free;  
Did make the Sun its painter, did discourse,  
Tongueless, across the void; dead voices force.*

—The Last Christmas of the Century:—

—SIR EDWIN ARNOLD.

441 B. C. (about).—Artemon is said to have invented the battering ram and the testudo. He was employed by Pericles in the siege of Samos.

212 B. C.—Archimedes used the principle of the well-sweep to overturn the vessels of the Romans at the siege of Syracuse.



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## DECEMBER 3.

BONADVENTURE CAVALIERI.

b. 1598. d. December 3, 1647.

Italian friar and mathematician. He was a pupil of Galileo and the inventor of the geometry of indivisibles, which resembles the infinitesimal calculus. He wrote a work on the subject and others on conic sections and trigonometry.

*No way has been found for making heroism easy,  
even for the scholar. Labor, iron labor, is for him.  
The world was created as an audience for him;  
the atoms of which it is made are opportunities.*

—Greatness: EMERSON.

*Great thoughts, not bound by space and time,  
Expand to every land and clime,  
Not seen or weighed or measured,  
Yet in the active mind are treasured.  
Great thoughts the riches of the soul,  
That ever point the heavenly god  
And help us in the glorious way  
Which leads to an eternal day.*

—PROF. JOHN MOORE.

2095 B. C.—The science of geometry was cultivated.

200 B. C. (about).—Archimedes demonstrated that the squares on the legs is equal to that on the hypothenuse of right triangles. The elements of the truth he had already, but when the method of proving it came to him he cried "Eureka!" like a madman.

1630.—Girard Desargues first investigated synthetic geometry, and he and Kepler introduced the doctrine of infinity into geometry.

SIR ROWLAND HILL.

b. December 3, 1795. d. August 27, 1879.

English author of cheap postage system or inventor of the penny postage. He made many ingenious machines. He acquired mathematics by teaching others and became an astronomer and an expert land surveyor. He invented an instrument for accurately measuring time in connection with astronomical observations and suggested the propulsion of steamboats by a screw and the assorting of mail matter in coaches in 1826. He invented a rotatory printing-press, which was a success.

*To our thoughts they give the speed of lightning;  
and to our time pieces, the punctuality of the sun;  
and though they can not provide us with the boasted  
lever of Archimedes to move the earth, or to indicate  
the spot upon which we must stand, could we  
do it, they have put into our hands tools of match-  
less power, by which we can study the remotest  
worlds; and they have furnished us with an intel-  
lectual plummet, by which we can sound the depths  
of the earth, and count the cycles of its endurance.*

—Science and Art: SIR D. BREWSTER.

1581.—Post-offices were established in England.

1678.—First mail was carried between Boston and New York, "for more speedy intelligence and dispatch of affairs." The letters were carried by a messenger, who was directed to go and return once a month.

1895.—Mails were first sent on the overland route to India.

1840.—The postage stamp (for mailing letters) was used for the first time in the United States.

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SATURDAY.

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MEMORANDA AND DIARY.

# DECEMBER 4.

TIMOTHY ALDEN.

b. 1819.

*d. December 4, 1858.*  
American inventor. Constructed a composing and distributing machine for printing. His idea was to arrange the type in cells around the circumference of a horizontal wheel. By the rotation of the wheel several receivers were also made to rotate and these picked up the proper type from respective cells. His brother, Henry W., made many improvements after the death of the inventor.

*Full little knowest thou who hast not tried,  
What hell it is in suing long to bide;  
To lose good days that might be better spent;  
To waste long nights in pensive discontent;  
To spend to-day, to be put back to-morrow;  
To feed on hope, to pine with fear and sorrow.*

*The man who seeks one thing in life, and but one,  
May hope to achieve it before life be done  
But he who seeks all things, wherever he goes,  
Only reaps from the hopes which around him he sows  
A harvest of barren regrets.* —OWEN MEEDITH.

1720.—Caslon cast the first types in England. William W. Johnson invented a type-casting machine, as did also George B. Lothian, but at a later date.

1831.—The printers formed their first union.

1842, December 17.—James Young set up the "Family Herald" with a type-composing machine.

1866.—Otto Mergenthaler invented the linotype.

BENJAMIN SILLIMAN, JR.

b. December 4, 1816.

*d. January 14, 1885.*  
American chemist. In 1845-'46, by invitation of New Orleans citizens, he delivered the first series of lectures on agricultural chemistry in the United States, which were repeated throughout the country. In 1853, with Charles R. Goodrich, he edited "World of Science, Art and Industry" (1853) and "The Progress of Science and Mechanism" (1854). 1854-'84 he was a professor at Yale. For many years he was Secretary of the Amer. Assn. Adv. Science.

*Our trust is not in musket or in sabre—  
Our faith is in the fruitfulness of labour,*

*The soul-stirred, willing soil;  
In homes and granaries by justice guarded,  
In fields from blighting winds and agents warded,  
In franchised skill and manumitted toil.*

—The River Boyne; SAMUEL FERGUSON.

*Millions march, but make no progress. They  
plow, sow, reap, hew, forge and build; it is the  
same dull story—furrow in the same old furrow;  
song on the same old key-note; driving a treadmill,  
grinding corn, like Samson, blinded.*

1756.—Joseph Black made known his discoveries on the nature of lime and of fixed air (carbonic acid gas).

1844.—Gerard Andreas Mulder introduced the term protein for the basis of albumen, fibrin and casein.

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MEMORANDA AND DIARY.

## DECEMBER 5.

JAMES ANDROUET DU CERCEAU.

b.

*d. about 1593.*

French architect. He began the Pont Neuf in 1578, built several magnificent mansions and was chosen by Henry IV. to continue the gallery of the Louvre. He did not complete this last undertaking, being compelled to leave France because he was a Protestant.

*Can thy style-discerning eye  
The hidden-working Builder spy,  
Who builds, yet makes no chips, no din,  
With hammer soft as snowflake's flight?*  
—MONADMOCK: EMERSON.

*Yea, and I heard without  
In the fresh morning air the trowels fall  
Upon the stone, a thin noise far away;  
For high up wrought the masons on that day,  
Since to the monks that house seemed scarcely well  
Till they had set a spire or pinnacle  
Each side of the great porch.*  
—The Wanderers: WILLIAM MORRIS.

1248, August 15.—The cathedral of Cologne was founded by Archbishop Conrad von Hochstade; the architect was Gerhard von Riehlor Rile.

1280.—Stucco-work was invented by Magaritone.

1598.—Rialto at Venice commenced by Michael Angelo and finished in 1594.

1613-1698, October 9.—Claude Perrault lived. He constructed the façade of the Louvre. He wrote a treatise on the Five Orders of Architecture and an account of several machines of his own invention.

DINOCHARES, or DINOCHARES.

b. *about 330 B. C.*

*d. about 278 B. C.*

Macedonian architect, who proposed to Alexander to cut Mount Athos into a statue of that monarch. He rebuilt the temple of Ephesus. He planned the city of Alexandria in Egypt.

*A vast and populous city, where  
Rose dome, and tower, and spire,  
And many a gilded pinnacle,  
Far-seen, as the bright sunset fell,  
Like glittering points of fire.*

*A city vast and populous,  
Whose thronging multitude  
Sent forth a sound afar-off heard,  
Strong as the ocean-flood.*

—MARIEN'S PILGRIMAGE: MARY HOWITT.

700 B. C. (about).—The temple of Juno at Samos was erected.

550 B. C.—The Doric temple of Athene at Aegina was erected.

544 B. C.—The temple of Diana at Ephesus (built seven times) was planned by Ctesiphon.

534-510 B. C.—Rome. Tarquinius Superbus completed the temple of Jupiter Capitolinus.

444-440 B. C.—The temple of Jupiter at Olympium was erected by Libon of Elis. (508-409.—At Aegina.)

433 B. C. (about).—The temple of Apollo Epicurus, near Phigalia, in Arcadia, was erected by Ictinus. The Phigalian marbles were cut for it.

336 B. C.—The temple of Diarr at Ephesus was re-erected.

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MEMORANDA AND DIARY.

# DECEMBER 6.

JOSEPH BLACK.

- b. 1728. d. December 6, 1799.  
Scottish chemist and anatomist. His experiments upon quicklime and other alkaline substances laid the foundation of quantitative analysis, and the distinction between "fixed" and common air led to pneumatic chemistry. He discovered latent heat. His investigations formed the basis of modern thermal science and led to Watt's improvements in the steam engine and thereby to modern industrial developments. He originated the theory of "specific heat." In 1767 he first inflated a balloon with hydrogen.

*Father rolls the storm of heat ;  
I feel its fiercer billows beat  
Like a sea which me involds ;  
Heat with countless fingers moulds,  
Swells, and mellow, and matures,  
Paints, and flavors, and allures,  
Bird and brier thy warms,  
Still enriches and transforms,  
Gives the reed and lily length,  
Adds to oak and oen strength,  
Transforming what it doth unfold,  
Life out of death, new out of old.  
—May-Day : EMBESON.*

1849-1898, August 30.—John Hopkinson lived. He introduced many improvements into lighthouse apparatus, notably the group flashing apparatus. In one of his papers in 1879 he first introduced the method of graphically depicting certain phenomena by means of characteristic curves—indicator curves.

WERNER SIEMENS.

- b. 1816. d. December 6, 1892.  
English inventor, metallurgist and electrician. He was associated with his brother William in all his works. They made improvements in the application of electricity, plating by metals and in the solutions used for gilding and silvering. He devised a "chronometric governor" for steam engines which was worked out by William and the process of "anastatic printing," was developed by the brothers. They built the Indo-European telegraph in 1868-'69. In 1856 Werner brought out the Siemens armature, an innovation more valuable than any other made up to that time. The credit of the first successful electrical railway is due to Werner, who built in Berlin, in 1879, a narrow-gauge line, laid down in a circle 900 yards in length.

*Ah, why shouldst thou be dead, when common men  
Are busy with their trivial affairs,  
Having and holding ? Why, when thou hadst read  
Nature's mysterious manuscript, and then  
Wast ready to reveal the truth it bears,  
Why art thou silent ? Why shouldst thou be dead ?  
—Three Friends of Mine.*

145 B. C.—Gilding was first practiced at Rome.  
1680.—The art of gilding on wood, previously known, was improved.  
1841.—Anastatic printing, in which printed matter was transferred upon zinc plates, was invented by Baldernus.



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MEMORANDA AND DIARY.

## DECEMBER 7.

WILLIAM BARTON ROGERS.

b. December 7, 1804.

d. May 30, 1882.

American geologist. He studied the green sand and calcareous marl of eastern Virginia and determined their value as fertilizers. 1835-'42, he was engaged on the geological survey of Virginia. With his brother, Henry D., State geologist of Pennsylvania, he unfolded the historical geology of the great Appalachian chain. They investigated the solvent action of water on minerals and rocks and demonstrated that the value of coal beds depended upon the amount of disturbance to which the inclosing strata had been submitted. Together they published "The Laws of Structure of the More Disturbed Zones of the Earth's Crust," in which the wave theory of mountain chains was first announced. He was the author of papers on geology, chemistry and physics, and "Strength of Materials" (1838) and "Elements of Mechanical Philosophy" (1852).

*Through knowledge we beheld the world's creation,  
How in his cradle first he fostered was;  
And judge of nature's cunning operation,  
How things she formed of a formless mass;  
By knowledge we do learn ourselves to know;  
And what to man and what to God we owe.*

—SPENSER.

1605.—Stevinus demonstrated the principle of the parallelogram of forces and the funicular polygon, by means of balls strung on a cord.

THEODOR SCHWANN.

b. December 7, 1810.

d. January 11, 1882.

German physiologist; professor in the University of Louvain. He discovered a similarity between vegetable cells and the cells in the bronchial cartilage of a tadpole. He reasoned that if there was such similarity between vegetable and animal tissues and if the nucleus was so important in the vegetable cell as Schleiden believed, the nucleus should also be found in the ultimate particles of animal tissues. His surmise was correct. He sought to unify vegetable and animal tissues. One of his earliest discoveries was that of pepsin in the gastric juice.

*All mankind are students. How to live  
And how to die forms the great lesson still.*

—FESTUS; BAILEY.

*Intellect and industry are never incompatible.  
There is more wisdom, and will be more benefit, in  
combining them, than scholars like to believe, or  
than the common world imagine. Life has time  
enough for both, and its happiness will be increased  
by the union.*

—SHARON TURNER.

1814.—Sir Humphry Davy was the first to study and apply chemistry to agriculture, and evolved the "humus theory."

1870.—The formula for making liquid pepsin was discovered by Prof. Emil Scheffer; the formula for dried pepsin was discovered in 1872.

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MEMORANDA AND DIARY.

## DECEMBER 8.

ELI WHITNEY.

b. December 8, 1765.

d. January 8, 1825.

American inventor of the cotton-gin in 1793. Not having secured his patent, he had the mortification of beholding machines after his own plan in operation in every important cotton district in the States.

*First, with nice eye emerging Naiads cull  
From leathery pods the vegetable wool;  
With wiry teeth revolving cards release  
The tangled knots, and smooth the ravel'd fleece;  
Next moves the iron hand with fingers fine,  
Combs the wide card, and forms th' eternal line;  
Slow with soft tips the whirling can acquires  
The tender skeins, and wraps in rising spires;  
With quicken'd pace successive rollers move,  
And these retain, and those extend, the rove;  
Then fly the spokes, the rapid axes glow;  
While slowly circumsolves the lab'ring wheel below.*

—Botanic Garden: DR. DARWIN.

1631.—Calico was named from Calicut, India. It was first brought into England by the East India Company.

1756.—The first cotton velvets and quiltings were made in England.

1760-1814.—William Longstreet lived. He invented a steam-boat and patented a valuable improvement in the cotton-gin, called the "breast roller," moved by horse-power.

1785.—Regular exportation of cotton began. One bag was sent from Charleston to Liverpool, twelve from Philadelphia and one from New York.

1795, March 5—1853, February 12.—Otis Pettee lived. He made improvements in cotton machinery, notably in roving frames or double speeders, by introducing a geared cone with gears arranged in a hyperbolic series.

JOHAN GOTTLIEB GAHN.

1745.

d. December 8, 1818.

Swedish mineralogist and chemist. He discovered that phosphorus is a component of bones and made some improvements in the arts of mining and metallurgy. He was the first to obtain manganese in the metallic state and to discover the primitive form of calcareous spar.

*Who are the farmer's servants? Not the Irish,  
nor the coolies, but Geology and Chemistry, the  
quarry of the air, the water of the brook, the light-  
ning of the cloud, the castings of the worm, the  
plough of the frost.*

Old Age: EMERSON.

*Faint was the light at first that shone  
On giant fern and mastodon,  
On half-formed plant and beast of prey,  
And man as rude and wild as they.  
Age after age, like waves, o'er ran  
The earth, uplifting brute and man;  
And mind at length, in symbols dark,  
Its meanings traced on stone and bark.  
On leaf of palm, on sedge-wrought robb,  
On plastic clay and leathern scroll,  
Man wrote his thought: the ages passed,  
And lo! the Press was found at last.*

—WHITTIER.

1839.—Count Strzelecki, Prussian geologist, discovered gold in Bathurst, Wellington and other places in Australia.

1875, August 27.—Lecoq de Boisbaudran discovered gallium.

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THURSDAY.

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MEMORANDA AND DIARY.

## DECEMBER 9.

JOSEPH BRAMAH.

*b. April 13, 1749.*

*d. December 9, 1814.*

One of England's greatest mechanics. He invented the hydrostatic press, the admirable lock that bears his name and machinery for smoothing surfaces. He produced machinery for turning spherical surfaces either convex or concave; also for making paper in large sheets, for printing by means of a roller. He made a machine for numbering bank-notes and devised a new mode of rendering timber proof against dry-rot.

*Idleness is more troublesome to a good mind than to do nothing; for, beside the furtherance of our estate, the mind doth both delight and better itself with exercise. There is this difference, then, betwixt labour and idleness, labour is a profitable and pleasant trouble, but idleness is a trouble both unprofitable and comfortless.*

—HALL.

170 B. C.—Paper was invented in China.

716.—The art of making paper was brought from Samarcand by the Arabs.

1002.—Paper was made of cotton rags.

1390.—The first mill for making linen paper was established.

1816.—The first paper-making machine in Germany was made by Keristan at Halle.

1828.—Paper was made from straw and hay.

1890.—Fourdrinier machine was used in manufacture of paper in England at Windham.

EZRA CORNELL.

*b. January 11, 1807.*

*d. December 9, 1874.*

American mechanic, philanthropist and capitalist. He took the lead in the construction of the first telegraph lines and organized many of the early companies, sharing in all the struggles and disappointments. He was one of the original founders of the Western Union Telegraph Company and was the founder of Cornell University at Ithaca, N. Y., the greatest industrial school of America. The water-power tunnel at Fall Creek, Ithaca, N. Y., was conceived and executed by him.

Who "a new heaven and a new earth" beheld!  
And to! we see the day

That ends its weltering way.

And weds the nations, long asunder held!

Thousands of toil, of failure, fear,

What are they now to ears that hear,

To eyes that see their triumph near?

When lightning-flames the ends of earth shall weld,

And wrong and right, by lightning beams dispelled,

Shall lift from all man's race,

And God the Father's face

Shall smile o'er all the world millennial grace!

—The Atlantic Telegraph.

REV. GEORGE L. TAYLOR.

1837.—Samuel F. B. Morse first publicly exhibited his telegraph.

1851.—Western Union Telegraph Company established.

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MEMORANDA AND DIARY.

## DECEMBER 10.

MATTHIAS WILLIAM BALDWIN.

b. December 10, 1795.

d. September 7, 1866.

American manufacturer. He devised and patented a process for plating with gold and manufactured bookbinders' tools and calico-printers' rolls. His factory was the first to make this country independent of foreign supply. About 1828 he turned his attention to the manufacture of steam engines, and at this time constructed a five-horse-power engine. His first locomotive, called the "Ironsides," was made for the Philadelphia and Germantown Railway and was placed on the road November 23, 1832. His inventions and improvements in the construction of locomotives are very numerous, and among these the most important was perhaps the flexible truck locomotive patented August, 1842.

*Behold, smoke-panoplied, the wondrous car!*

*Strong and impetuous, but obedient still;*

*Behold, it comes, loud panting, from afar,*

*As if it lived, and of its own fierce will*

*Ran a free race with wild winds blowing shrill;*

*Snake-like it comes.*

—MACKAY.

1825.—The first railway opened to the public was the Stockton and Darlington Railway, England, built by Pease and Stephenson.

1829.—The manufacture of railway locomotives began after the completion of the "Rocket."

LEVI HEYWOOD.

b. December 10, 1800.

d. July 21, 1892.

American inventor. He was among the first to experiment in shaving and splitting cane and made many useful inventions, including a tilting chair, machines for splitting, shaving and otherwise manipulating rattan and machinery for bending wood. He also invented a process for injecting rattan with India rubber as a substitute for whalebone.

*Let no man dare, let no man ever dare*

*To mark, on Time's great way, "No Thoroughfare!"*

*Weave, brothers, weave!—Toll is ours;*

*But toll is the lot of men;*

*One gathers the fruit, one gathers the flowers,*

*One sows the seed again!*

*There is not a creature, from England's king,*

*To the peasant that tills the soil,*

*That knows half the pleasure the seasons bring,*

*If he have not his share of toil!*

—*The Weaver's Song*: BRYAN W. PROCTOR.

The English claim to have invented the process of damasking linen, watering silk, making cane chairs and coloring and marbling books.

1641.—Rope first manufactured at Boston, Mass.

1784, December 5.—A rope-making machine was patented by Richard March.

1792.—A rope-making machine was patented by Edmund Cartwright, reducing the labor nine-tenths.



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ROBERT KOCH.

b. December 11, 1843.

d.

Eminent German bacteriologist. About 1880 he discovered a method of coloring microscopical preparations, by means of which (in 1882) he isolated the tubercle bacillus and produced tuberculosis by its inoculation in animals. He discovered the so-called "comma" cholera bacillus. At the beginning of the year 1890 he became famous for his discovery of the phthisis bacillus and for a specific agent which arrests the ravages of the same.

*Life is girt all round with a zodiac of sciences, the contributions of men who have perished to add their point of light to our sky.*

—*Representative Men*: EMERSON.

1782.—Vaccination was first performed.

1796.—Vaccination for small-pox was performed by Jenner. 1870 (about).—Antiseptic surgery was introduced by Sir Joseph Lister to exclude germs of disease from wounds.

1879.—Physicians used vaccine direct from animals.

1890, January 21.—Dr. Weichselbaum, of Vienna, announced the discovery of the bacillus of influenza.

1890, November 17.—Koch announced the discovery of a remedy for tuberculosis in its incipient stage.

1892, January 5.—Dr. Pfeiffer discovered the influenza bacillus, the smallest then discovered.

GEORGE AUGUSTUS KOENIG.

1845.

d.

German chemist. His scientific researches include the invention of chronometry, or the application of complementary colors to the quantitative estimation of metals that are dissolved in known quantities of glass fluxes; the re-examination and more perfect determination of numerous other species and the development of a method of freeing silver from low-grade ores by the combined action of chlorine, a concentrated solution of salt and steam pressure.

*Strange alchemy!—and stranger end of life—*

*To toil and glow before the world's great forge,*

*To blow its smouldering coals with urgent breath,*

*To force the vital dew from forehead, grimed*

*With dust and smoke, and slowly thus to steal*

*The blood from muscles full and rounded cheeks;*

*Until the fibres of the shrunken face*

*Stand net-like out like faded, eaten leaves—*

*All—all to wring the baser from the precious;*

*Black coats from music-flashing diamonds.*

—*Love's Alchemy*: H. W. PARKER.

1475.—Diamond polishing was invented by Lagwig von Berkem, of Belgium.

1837.—Marc Antoine Gauthier made artificial sapphires out of equal parts of alum, and sulphate of potash heated in a crucible.

1893, January 1.

—January.—The lithoscope, an instrument for distinguishing precious stones, invented by Sir David Brewster, was described by him.

1890.—Artificial diamonds were made at Paris.

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MEMORANDA AND DIARY.

## DECEMBER 12.

DR. ERASMUS DARWIN.

b. December 12, 1731.

d. April 18, 1802.

English physician, botanist and industrial poet. He was intimate with Bolton, Watt, Wedgewood and other well-known men. He invented an ingenious carriage and many mechanical contrivances. The permanent interest in his writings exists in his exposition of the form of evolutionism afterwards expounded by Lamarck. The first part of his "Botanic Garden" (The Economy of Vegetation) was published in 1782, and the second part (The Loves of the Plants) in 1789.

*Oh! though thy genius, Darwin! amply fraught  
With native wealth, explore new worlds of mind;  
Whence the bright ores of dressless wisdom brought,  
Stamp'd by the Muse's hand, enrich mankind;*

*Though willing Nature to thy curious eye,  
Involved in night, her mazy depths display;  
Till at their source thy piercing search descry  
The streams, that bathe with Life our mortal clay;*

*Though, boldly soaring in sublimer mood  
Through trackless skies, on metaphysic wings,  
Thou darest to scan the approachless Cause of Good,  
And weigh with steadfast hand, the sum of Things.*

—To Dr. Darwin; REV. W. B. STEVENS.

1774 (about).—Animal magnetism, professing to cure diseases by sympathetic affection, was practiced by Father Hehl, a Jesuit, at Vienna.

JOSEPH BANCROFT READE.

b. April 5, 1801.

d. December 12, 1870.

English chemist, microscopist and photographer. In April, 1839, he separated heat-rays from those of light by the use of a hemispherical lens, so as to take pictures by means of cemented achromatic objectives. About the same time he discovered the value of an infusion of galls as a sensitizer of paper treated with silver nitrate and that of hyposulphite of soda for fixing the photographic image. He took the first microphotographs with the solar microscope and invented the hemispherical condenser for the microscope and the equilaeral prism for microscopic illumination.

*If a man know the laws of nature better than  
other men, his nation cannot spare him, nor if he  
know the power of numbers, the secret of geometry,  
of algebra, on which the computations of astronomy,  
of navigation, of machinery, rest. If he can con-  
verse better than any other, he rules the minds of  
men wherever he goes; if he has imagination, he  
intoxicates men. If he has wit, he tempers despot-  
ism by epigrams; a song, a satire, a sentence, has  
played its part in great events. Eloquence a hun-  
dred times has turned the scale of war and peace  
at will.*

—Progress of Culture; EMBERSON.

1820.—The daguerreotype, a picture formed on a metallic plate by a chemical action of light, was invented by Louis Jacques Mande Daguerre.

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MEMORANDA AND DIARY.

## DECEMBER 13.

FRANCIS LANA.

b. December 13, 1631.

d. February 26, 1687.  
Jesuit scholar. Conceived the first notion of a balloon in 1670. Asserted the possibility of raising a vessel by means of metal balls strong enough, when exhausted, to resist the pressure of the external air but at the same time so thin as to be lighter than their bulk of air.

*What is true knowledge?*

*Is it to delve the earth, or soar the sky;*

*To mix, and analyze, and mete, and weigh*

*Her elements, and all her powers decry?*

*These things, who will may know them, if to know*

*Breed not vain-glory.*

*Whence came we, what to do, and whither go—*

*This is true knowledge, and the "whole of man."*

—True Knowledge: BISHOP MANT.

1650. — Guericke invented the air-pump.

1748 or '49—1898, March 6.—John Stevens lived. In 1804 he built a vessel to navigate the Hudson River which was propelled by twin screws. This was the first application of steam to the screw propeller. In 1791 he patented a steam generating plant and made improvements in bellows and in Thomas Savary's engine. In 1803 he patented a multi-tubular boiler. On October 11, 1811, he established the first steam ferry in the world with the "Juliana," which plied between New York City and Hoboken. In 1813 he built a ferry-boat of two separate boats with a paddle-wheel between them.

1784, September 15.—The first balloon ascent with hydrogen gas was made in England by Lunard.

1875, January 12.—The aeroplane was successfully tried at Chatham by Denatrouze, the inventor.

EDMUND LOUIS GRAY ZALINSKI.

b. December 13, 1849.

d.

Polish-American soldier. Developed the pneumatic dynamite torpedo gun. He invented the electrical fuse and other devices for the practical application of the weapon and also devised a method for the exact sight-allowance to be made for deviation due to the wind in the use of rifled artillery and small arms. His other inventions include an intrenching-tool, a ramrod bayonet and a telescopic sight for artillery.

*The best armor against temptation is to keep out of the range of its guns.*

*A pound of energy with an ounce of talent will achieve greater results than a pound of talent with an ounce of energy.*

*You must either soar or stoop,  
Fail or triumph, stand or droop,  
You must either serve or govern,  
Must be slave or must be sovereign;  
Must, in fine, be block or wedge,  
Must be anvil or be sledge.*

1406 B. C.—The sling was used in battle with great skill by the Benjamite slingers.

1063 B. C.—Armor was used in battle by Goliath.

1055 B. C.—David commanded the use of the bow to be taught to the Hebrews.

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MEMORANDA AND DIARY.

## DECEMBER 14.

TYCHO BRAHE.

b. December 14, 1546. d. October 13, 1601.

Danish astronomer. In 1582 he began a systematic series of observations on the planets, especially Mars, to correct the existing tables. His greatest discoveries were of the motion of the moon. He rediscovered the inequality called the variation, first noticed by Aboul Wefa. He laid deep the foundations in minute observation of the whole majestic structure of modern astronomy. He has left a catalogue of the exact position of a thousand fixed stars and a multitude of observations of the exact positions of the planets. In 1598 he published his work "Astronomia Instaurata Mechanica."

*Overburthen not thy memory to make so faithful  
a servant a slave. Remember Atlas was weary.  
Have as much reason as a camel, to rise when thou  
hast thy full load. Memory, like a purse, if it be  
over full that it cannot shut, all will drop out of it.  
Take heed of a glutinous curiosity to feed on many  
things, lest the greediness of the appetite of thy  
memory spoil the digestion thereof. Marshal thy  
notions into a handsome method. One will carry  
twice more weight, trust and packt up in bundles,  
than when it lies untowardly flapping about his  
shoulders.*

—FULLER.

2234 B. C.—Astronomical observations were begun at Babylon.

1714.—An observatory was erected at Bologna.

JOHN BLOOMFIELD JERVIS.

b. December 14, 1795. d. January 12, 1885.

American engineer. Engaged in the construction of the Erie Canal and the survey and construction of the Delaware and Hudson Canal; chief engineer of the Albany and Schenectady and the Schenectady and Saratoga Railroads, and for the latter road invented the locomotive truck. In 1833 he was chief engineer of the Chenango Canal, and originated on this work artificial reservoirs for the supply of water; in 1836 he was engineer in charge of the Croton Aqueduct, and from 1846-'48 he was consulting engineer of the Boston waterworks.

*To him who has, by words and thought,  
On history's pages wonders wrought;  
To him whose hand, like magic, brings  
Into existence greatest things;  
Who spans with bridges rivers wide—  
Whose railways scale the mountain's side;  
Him at whose touch the arid plain  
Is watered as by heavenly rain:  
Through whom the desert verdant grows—  
Waste places blossom as the rose;  
Whose bands of steel, in endless chain,  
From Golden Gate to rock-ribbed Maine,  
From frozen shore to tropic strand  
Stretch over all our favored land.*

—The Civil Engineer: O. H. SHEFFIELD.

2357-2258 B. C.—During the reign of Emperor Yao roads and canals were built and commerce was fostered. He established marts and fairs throughout the land.



1904.

WEDNESDAY.

1904.

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MEMORANDA AND DIARY.

## DECEMBER 15.

ARTHUR ASHPITEL.

b. December 15, 1807. d. January 18, 1869.

English architect and archæologist. He built St. John's Church at Blackheath and that of St. Barnabas at Homerton, as well as many other structures.

*Lo, with what depth of blackness thrown  
Against the clouds, far up the skies,  
The walls of the cathedral rise  
Like a mysterious grove of stone,  
With fife lights and shadows blending,  
As from behind the moon ascending,  
Lights into dim aisles and paths unknown!  
The wind is rising, but the boughs  
Rise not and fall not with the wind  
That through their foliage sobs and sighs;  
Only the cloudy rack behind  
Drifting onward, wild and ragged,  
Gives to each spire and buttress jagged  
A seeming motion undefined.*

—Golden Legend: LONGFELLOW.

500-800 A. D.—Remarkable papyrus manuscript in Greek, by Akhmin, was found on the Nile in upper Egypt.

1874, March.—Dr. Schliemann, by excavating, discovered the supposed site of Mycenæ. In 1878, November 26, he announced the discovery of the tomb of Agamemnon and others, besides many treasures at Mycenæ.

1887, February 26.—Capt. Conder discovered the key to the Hittite inscriptions.

1889, May.—The ruins of a great city were found in the forest near Palenque, Mexico; buildings five stories high were well preserved.

EARL CHARLES STANHOPE.

b. August 3, 1753. d. December 15, 1816.

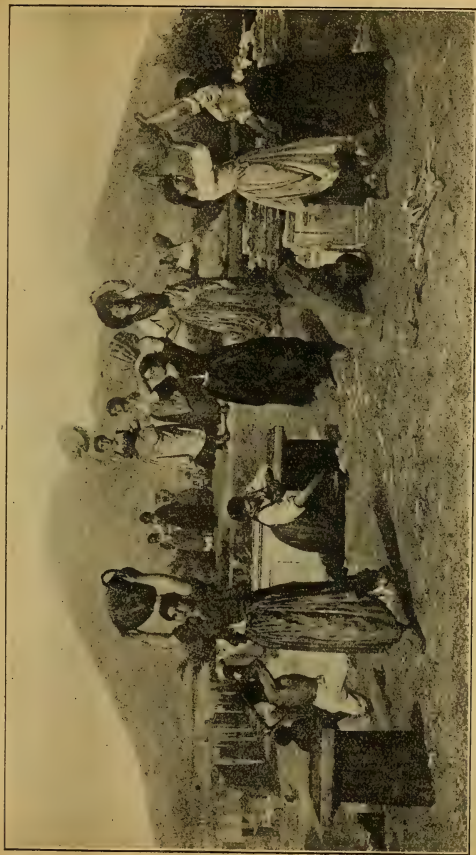
English inventor. Invented the printing press that bears his name and made improvements in musical instruments, devised a method of covering houses with a composition of pitch, sand and chalk and a new mode of burning lime. About 1777 he constructed two calculating machines. He invented the microscopic lens which bears his name and a means of curing wounds made in trees. In 1804 he, assisted by others, revived the art of stereotyping.

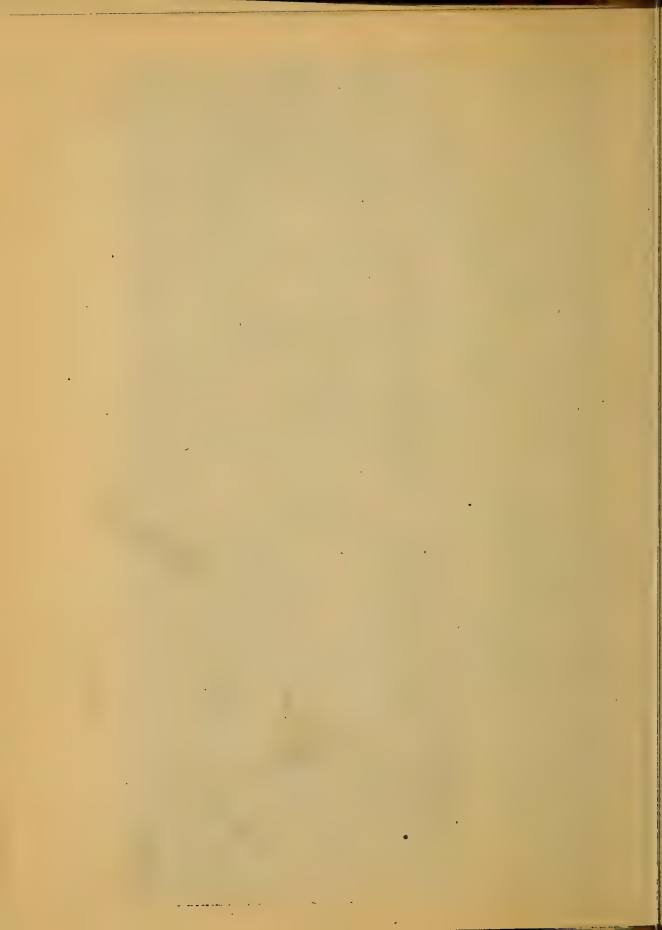
*The hive-like hum  
Of peaceful commonwealths, where sunburnt Toil  
Reaps for itself the rich earth made its own  
By its own labor, lightened with glad hymns  
To an omnipotence which thy mad bolts  
Would cope with as a spark with the vast sea,—  
Even the spirit of free love and peace,  
Duty's sure recompense through life and death,—  
These are such harvests as all master-spirits  
Reap, haply not on earth, but reap no less  
Because the sheaves are bound by hands not theirs.*

—Prometheus: LOWELL.

1700.—J. Van der Mey cast the first stereotype plates.  
1730.—Stereotyping was practiced by William Ged at Edinburgh.

1764-1836.—Firmen Didot lived. By processes of his own invention he gave stereotyping a more brilliant and useful application. It was first applied to the logarithmic tables of Gallet and also executed the great decimal tables of the register of lands. He introduced a new and more simple system of stereotyping.





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THURSDAY.

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MEMORANDA AND DIARY.

## DECEMBER 16.

WILLIAM PETTY.

- b. 1623. *d. December 16, 1687.*  
English mathematician, statesman and inventor. Invented a letter-copying machine and a double-bottomed ship. He also patented inventions for the improvement of carriages, cannon and pumps. He is best known by his admirable survey of Ireland. His map was the best ever made of that country up to that date. He was an original member of the Royal Society and the first meetings were held at his lodgings.

*The mind of man is this world's true dimension;  
And knowledge is the measure of the mind;  
And as the mind, in her vast comprehension,  
Contains more worlds than all the world can find;  
So knowledge doth itself far more extend,  
Than all the minds of men can comprehend.*

—LORD BROOKE.

- 1467.—Maps were made by wood engraving by the monk Donis.  
1606.—Edmund Gunter invented Gunter's chain for surveying.

1787.—Jesse Ramsden completed the great theodolite. It was an instrument for measuring horizontal angles.

1835, December 11.—Benjamin Smith Lyman was born. He introduced several forms of improved surveying instruments, including the topographer's transit, level rod notation, mine stadia, solar transit and the use of equidistant curves, or contour lines for mapping the structure of rock beds.

HENRY HUDSON.

- b. *d. about July, 1611.*  
English navigator. 1607, April 23, he started to discover a northeast or northwest passage to China, in which he was unsuccessful. In 1609, April 6, he made another voyage and discovered the Hudson River, returning to England November 7. He next sought a passage by way of Hudson's Straits. On August 4, 1610, he entered Hudson's Bay, where his ship was frozen in, and he remained until June 18, 1611. He and a few of the crew were abandoned by the rest and all perished.

*Thine was unstinted zeal, unchilled devotion,*

*While the blue realm had kingdoms to explore,—*

*Patience, like his who ploughed the unfurrowed ocean,*

*Till o'er its margin loomed San Salvador.*

*Through the long nights I see thee ever waking,*

*Thy footstool earth, thy roof the hemisphere,*

*While with thy griefs our weaker hearts are aching,*

*Firm as thine equatorial's rock-based pier.*

—*To Benjamin Althorp Gould: HOLMES.*

1577, December 13.—Francis Drake commenced his voyage around the world. 1580, November 3.—He completed his undertaking. In 1585 he discovered Greenland.

1755, May 11.—1806.—Robert Gray lived. 1789-1790, in the "Columbia," he was the first man to carry the American flag around the globe. 1791, May 11, he discovered the mouth of the Columbia River.

1872, July 21.—Nils Adolf Erik Nordenskjöld sailed on an Arctic expedition. 1875.—Another. 1878-79.—He accomplished the northeast passage.

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MEMORANDA AND DIARY.

## DECEMBER 17.

JOSEPH HENRY.

*b. December 17, 1797 or 1799. d. May 13, 1878.*  
American physicist. He was a pioneer investigator in electricity. His first important discovery was that of the electro-magnet. He showed that the electro-motive force of the battery must be proportional to the length of the conductor. This led in 1830 to the development of the "intensity" magnet, which made the electric telegraph possible. In 1831 he constructed the first electro-magnetic telegraph and the first electro-magnetic engine by means of an automatic pole-changer. He was the first to use the electro-magnet of soft iron, and he invented the principle of the relay. His only book was "Syllabus of Lectures on Physics" (1844).

*I count him a great man who inhabits a higher sphere of thought, into which other men rise with labor and difficulty; he has but to open his eyes to see things in a true light, and in large relations; whilst they must make painful corrections, and keep a vigilant eye on many sources of error. He is great who is what he is from nature, and who never reminds us of others.*

—*Representative Men*: EMERSON.

1820.—Faraday experimented in electro-magnetism.  
1822, January.—Faraday described his discovery of electromagnetic rotation.  
1856.—Prof. John Tyndall proved the existence of diamagnetic polarity.

HENRY ROSSITER WORTHINGTON.

*b. December 17, 1817. d. December 17, 1880.*  
American inventor. In 1840 he used steam for the propulsion of canal-boats and employed the idle boiler to supply its own water. He devised a small steam cylinder with an attached pump, which operated automatically. In 1841 he patented the independent feed-pump, which developed into the direct-acting steam pump which he patented in 1849. In 1854 he erected in Savannah the first direct-acting compound condensing engine and the first compound engine used in water-works. The invention of the duplex pump followed.

*Now in brazen pumps the pistons move,  
The membrane valve sustains the weight above;  
Stroke follows stroke, the gelid vapor falls;  
And misty dewdrops dim the crystal walls;  
Rare and more rare expands the fluid kin,  
And silence dwells with vacancy within.*

*How up exhausted tubes bright currents flow  
Of liquid amber from the lake below,  
Weigh the long column of the incumbent skies,  
And with the changeful moment fall and rise.*

*Thus doth the sliding piston bear  
The vestured columns of incumbent air;  
Press'd by the incumbent air, the floods below,  
Through opening valves, in foaming torrents flow,  
Foot after foot with lessened impulse move,  
And, rising, seek the vacancy above.*  
—*Botanic Garden*: DR. DARWIN.



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MEMORANDA AND DIARY.

## DECEMBER 18.

RICHARD OWEN.

b. *July 20, 1804.*

d. *December 18, 1892.*

English geologist, anatomist and paleontologist. Showed remarkable skill in the anatomy and reconstruction of extinct animals, such as the cheirotherium, the glyptodon, mylodon and plesiosaurus. He discovered two gigantic fossil birds, the dinornis and the epiornis. He was one of the first to use the microscope in the investigation of the structure of animals and was the first who employed the word "homology" in comparative anatomy. He opposed the Darwinian theory of natural selection, for which he substituted his "Hypothesis of Derivation."

*Search, penetrate through Nature's land,—  
Who searcheth only doth command.*

*How fancy loves around the world to stray,  
While judgment slowly picks his sober way;  
The stores of memory, and the flights sublime  
Of genius, bound by neither space nor time,—  
All these divine Philosophy explores,  
Till, lost in awe, she wonders and adores.*

—*The Library*: CRABBE.

1799.—An entire mammoth, with flesh and bones intact, was discovered in Siberia.

1812.—Cuvier showed that the Pterodactyl was a flying lizard.

1822.—At Lyme Regis, the first remains of the Plesiosaurus were discovered.

ANTOINE AUGUSTIN PARMENTIER.

b.

1737.

d. *December 18, 1813.*

French horticulturist. It was by his efforts that France has the propagation of potatoes, maize and chestnuts (1783). His publications are numerous. Among them are "Researches on the Use and Cultivation of the Potato"; "On the Best Method of Making Bread"; "A Treatise on the Chestnut"; "Remarks on Rural and Domestic Economy."

*A gen'rous mother is the kindly earth  
To all her faithful sons—but she is just.  
When her deep bosom we caress she smiles  
Rich harvests. Jealous, she demands our best  
In husbandry, attention, wisdom, care.  
Not to the stupid hind does she pour out  
The same stupendous crop that fills the veins  
Of him who proves his love, as love deserves.  
Intelligent devotion is her due,  
And he who knows her moods, her needs, her ways,  
And chemic nature, with a master's hand  
Will win her most abounding love and grace;  
And from his granaries direct a host  
Of feebler folk fit but to wield a hoe.*

—*To Edward Markham*: GILBERT RAMSAY.

1520.—Chocolate first introduced from Mexico into England. It was sold in the London coffee-houses soon after their establishment, 1650.

1558.—Tobacco was introduced by Hernandez.

1586.—Potatoes were introduced into England and Ireland.

1841.—Guano was introduced into England.

1851.—Guano was imported from Peru to the United States.

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MEMORANDA AND DIARY.

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## DECEMBER 19.

THOMAS ANDREWS.

- b. December 19, 1813. d. November 1885.  
 Scottish chemist. He received from the Royal Society, in 1845, a medal for his researches into the heat produced by chemical combination. He first showed in a paper published in 1863 that there was a continuity in the liquid and gaseous states of matter; that for each substance there was a critical temperature at which it became a homogeneous fluid, neither a liquid nor a gas.

*His warmth keeps the sea liquid and the atmosphere a gas, and all the storms which agitate both are blown by the mechanical force of the sun. He lifts the rivers and the glaciers up to the mountains, and thus the cataract and the avalanche shoot with an energy derived immediately from him. Thunder and lightning are also his transmitted strength. Every fire that burns, and every flame that glows, dispenses light and heat which originally belonged to the sun.*

— *The Influence of the Sun*: JOHN TYNDALL.

1615.—De Caus published his "Forcible Movements," containing theorems on the evaporation of water, the condensation and the expansive and explosive forces of steam.

1757.—Joseph Black established his theory of latent heat in Edinburgh; in 1760 he discovered latent heat in melting ice and in steam, and in 1763 he evolved his new theories of heat.

1853, January 4.—Captain John Ericsson exhibited a vessel in which caloric or heat was the motive power. Caloric ship "Ericsson" made a trial trip on Potomac January 11.

KARL WILLIAM SCHEELE.

- b. December 19, 1742. d. May 21, 1786.

Swedish chemist. He first obtained prussic acid in 1782 from Prussian blue; also discovered nitrous acid. He discovered a process of extracting phosphorus from bones and first prepared citric acid in the solid state, in 1784, from the juice of lemons.

*Heaven is not reached at a single bound;  
 But we build the ladder by which we rise  
 From the lowly earth to the varied skies,  
 And we mount to the summit round by round.*

— *Gradation*: J. G. HOLLAND.

*We have a debt to every great heart, to every fine genius; to those who have put life and fortune on the cast of an act of justice; to those who have added new sciences; to those who have refined life by elegant pursuits. 'Tis the fine souls who serve us, and not what is called fine society. Fine society is only a self-protection against the vulgarities of the street and the tavern.*

— *Considerations by the Way*: EMERSON.

1872.—Aarland discovered isocallylene.

1874.—Weiler discovered monomethylanthracene.

1882.—Jacobsen discovered hemellithol.

.....—Erlenmeyer elucidated naphthalene by his researches.

.....—Louis Jacques Thenard and Gay-Lussac discovered boron and proved that oxymuriatic acid is a simple substance. They also discovered peroxide of hydrogen.

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MEMORANDA AND DIARY.

## DECEMBER 20.

THOMAS GRAHAM.

- b. December 20, 1805. d. September 17, 1869.
- English chemist. He discovered that when a solution contained both crystallizable and uncrySTALLIZABLE or colloid substances the former would pass much more rapidly through an animal membrane than the latter. He gave the name of "dialysis" to this process of separation and that of "dialyzer" to the apparatus. Before 1840 he had discovered and proved the polybasic character of phosphoric acid. He discovered the law of the diffusion of gases.

*And then?—Wouldst Thou Thyself be still the same?  
Would God be God if lacking even me?  
Nay! Here I shout my challenge into space:  
Thou dar'st not lose, fronting Time's lonely face,  
One monad cell that thrills its life to Thee,  
One gem of love that sparkles back Thy flame!*

—WILLIAM S. JOHNSON.

*This secret is revealed in every trace of Nature's face,  
Whose seeming frown invariably tends to smiling ends,  
Transmuting ill into their opposite,  
And all that shocks the sense to subsequent delight.*

—MORAT ALCHEMY: HORACE SMITH.

1815.—Diffusion in solution was discovered by Parrot and in 1850 was thoroughly investigated by Thomas Graham. Fick also showed about the same time that the diffusion of dissolved substances followed the same law as the diffusion of heat.

THOMAS DUNKIN PARET.

- b. December 20, 1837. d.
- American inventor. He developed processes for the treatment of waste leather which fitted it for the lining of petroleum barrels and fireproof safes and for use, under the name "tanite," as a substitute for jet and ebonite in the manufacture of jewelry and fancy articles and as a base for solid emery wheels.

*The one who achieves, creates, builds is the true workingman, not the one who does the routine labor.*

—R. L. DAWSON.

*The golden hour of invention must terminate like other hours, and when the man of genius returns to the cares, the duties, the vexations and the amusements of life, his companions behold him as one of themselves—the creature of habits and infirmities.*

—ISAAC DISRAELI.

907 B. C.—Boots were invented.

600.—Saddles were used in riding.

1388.—Side-saddles were introduced by Queen Anne.

1400.—Spurs (of the present kind) came into use.

1770-1851.—William Edwards lived and greatly improved the process of tanning leather, accomplishing the act in one-fourth the time.

1818.—Seth Boyden produced first patent leather made in this country and he opened a factory at Newark, New Jersey, in 1819.

1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

## DECEMBER 21.

JOSEPH WHITWORTH.

b. December 21, 1803. d. January 22, 1887.

English toolmaker and inventor. He invented a machine for planing and scraping a metallic surface, by which he succeeded in producing the first perfect plane ever made in metal; also a measuring machine which was capable of measuring a millionth part of an inch. He invented a street-sweeping machine and introduced a uniform system of threads of screws and parts of machinery. He produced a rifle three times as powerful as the old rifle, and invented machinery which could produce his rifles with unvarying perfection.

*The beginning of civilization is the discovery of some useful arts, by which men acquire property, comforts, or luxuries. The necessity or desire of preserving them leads laws and social institutions . . . In reality, the origin as well as the progress and improvement of society is founded on mechanical and chemical inventions.*

—SIR HUMPHRY DAVY.

1836.—Axes and edged tools were manufactured at Hartford, Conn.

1835, August 17.—Monkey wrench was patented by Solyman Merrick.

1838.—Thomas W. Harvey patented a gimlet-pointed screw.

1858 (about).—Sir Joseph Whitworth made a machine to measure one-millionth part of an inch.

1865.—Ralph Hart Tweddell invented his first stationary riveter.

HEINRICH DANIEL RUHMKORFF.

b. 1803. d. December 21, 1877.

German-French manufacturer of scientific instruments. He is the reputed inventor of the Ruhmkorff coil (1851), which was named after him.

*Young man! you need no assistance. It would hinder rather than facilitate your progress. If you have the will and resolution which you ought to possess, and that manly self-reliance which is indispensable to success in every department of life, you have all the assistance you need. With these you may overcome every obstacle, and attain to eminence in any position which you may be called to fill. . . . A young man must be thrown upon his own resources in order to bring out his capabilities. The struggle which is to result in eminence is too arduous, and must be continued too long, to be encountered and maintained voluntarily. It must be a struggle, as it were, for life itself. He who has a fortune to fall back upon will soon slacken his efforts, and finally retire from the contest.*

—Self-Made Men.

1812, January 25.—1898, May 5.—Charles Grafton Page lived. He labored to perfect machinery for the effective and economical use of electro-magnetism as a motive power. The discovery of the Ruhmkorff coil is claimed for him. In 1837 he discovered that an electro-magnet, when magnetized and demagnetized, gave forth a sound, and when the current through its coil was rapidly established and broken, these sounds may succeed each other with sufficient velocity to produce a musical tone.



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WEDNESDAY.

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MEMORANDA AND DIARY.

## DECEMBER 22.

SAMUEL NICOLSON.

b. December 23, 1791.

d. January 6, 1868.

American inventor. He made several valuable inventions, the most noteworthy being an improved steering apparatus for vessels and the wooden block pavement that bears his name and which was well adapted for light travel.

*No man knows who invented the mariner's compass, or who first hollowed out a canoe from a log. The power to observe accurately the sun, moon, and planets, so as to fix a vessel's actual position when far out of the sight of land, enabling long voyages to be safely made; the marvellous improvements in ship-building, which shortened passages by sailing vessels, and vastly reduced freight even before steam gave an independent force to the carrier—each and all were done by small advances, which together contributed to the general movement of mankind. . . . Each owes all to the others. The forgotten inventors live forever in the usefulness of the work they have done and the progress they have striven for.*

—H. M. HYNDMAN.

1302.—Ship's compass was invented.

1658.—Street paved with stone at New York; from the circumstance named "Stone Street," which name it still retains.

1777, August 14—1851, March 9.—Hans Christian Oersted lived. He was the founder of the science of electro-magnetism. In 1820 he announced his great discovery of the relation between magnetism and electricity. He demonstrated that the electric current, according to a uniform law, "exercised determined and similar impressions on the direction of a magnetic needle" near which it passed.

JOHN TYNDALL.

b. August 2, 1820.

d. December 4, 1893.

English physicist, railroad engineer, electrician. He was engaged in engineering operations on railways, diamagnetism and the polarity of the diamagnetic force, including researches on the magneto-optic properties of crystals and the relation of magnetism and diamagnetism to molecular arrangement. In 1859 he commenced his researches on radiant heat, which disclosed relations previously unknown. He wrote "Heat Considered as a Mode of Motion," 1863; "Notes on Sound," 1867; "Fragments of Science"; "Notes on Electricity," 1870; "Notes on Light," 1871.

*They taught the spheres, slaves to one golden rein,  
Their radiant labyrinths to weave around,  
Creation's mighty hearts: this made the chain,  
Which into interwoven systems bound  
All spirits streaming to the spiritual sun  
As brooks that ever into ocean run.*

Friendship: SCHILLER.

Eighteenth Century.—Heat was regarded as a fluid of an elastic and self-repellent nature permeating all water.

1798.—Count Rumford declared heat to be motion.

1812.—Humphrey Davy declared heat to be a form of vibration and that the laws of its communication were the same as for motion. Thomas Young had like convictions.

1845-'85.—Joule proved conclusively the character of heat and its mechanical equivalence.

1904.

THURSDAY.

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MEMORANDA AND DIARY.

## DECEMBER 23.

JAMES RUMSEY.

b. about 1743.

American inventor. Invented a steamboat and made various improvements in the mechanism of mills. He was involved in a controversy with John Fitch. He published a "Treatise on the Application of Steam."

*See how yon flashing herald treads  
The ridged and rolling waves,  
As, orasking o'er the crested heads,  
She bows her surly slaves!  
With foam before and fire behind,  
She rends the clinging sea,  
Beneath her hissing lee.  
With clashing wheel, and lifting keel,  
When winds are loud, and billows reel,  
She thunders foaming by!  
When seas are silent and serene  
With even beam she glides,  
The sunstine glimmering through the green  
That skirts her gleaming sides.*

—The Steamboat: HOLMES.

The earliest instrument for grinding manna and corn was the mortar. The hand-mill was in use among the Britons previous to the conquest by the Romans. The Romans introduced the water-mill.

1300.—The first linen paper mill in Germany was built.

1800, January 7—1868, July 19.—Moses Yale Beach lived. He invented a rag-cutting machine, which has since been generally used in paper-mills.

RICHARD ARKWRIGHT.

b. December 23, 1732.

d. August 3, 1792.

English inventor of the spinning-jenny, who was a barber in his youth. He is also celebrated as the founder or pioneer of the factory system. In 1761 he obtained the first patent for his spinning frame.

*A circular machine of new design,  
In comic shape, which drew and spun a thread  
Without the tedious toil of needless hand.*

—Fleece: DRAS.

*The tiny worm whose curious toil  
First spun each soft and silken line,  
Those small thin threads, so bright and fine,  
In wondrous order all combine  
To make his cradle and his tomb.  
He weaves his silken winding sheet,  
With patient skill, compact and neat,  
And dies to feed the hungry loom.*

—The Weaver: FRANCES FREELING BRODERIP.

1819, July 2—1884, February 25.—Lucius James Knowles lived. He invented the Knowles steam-boiler, feed-regulator and a machine for spooling thread. In 1858 he constructed patent steam-pumps, steam pumping-engines, an automatic boiler-feeder and a loom for producing all kinds of narrow textile fabrics.

1871.—Henry Davey, an English engineer, took out his first patent for the differential pumping-engine, which was adopted by the largest mining and water-works in Great Britain. He designed and introduced double-acting rams for high lifts. The "separate condenser" for pumping and winding engines was his, as was also the hydraulic pumping-engine. A recent invention is a compensating-compound and triple-expansion pumping-engine for water supply.

1904.

FRIDAY.

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MEMORANDA AND DIARY.

## DECEMBER 24.

JAMES PRESCOTT JOULE.

b. December 24, 1818.

d. October 11, 1889.

English experimental philosopher. One of the founders of the modern theory of the correlation of forces. He discovered that an iron bar was increased in length on being magnetized. He improved the tangent galvanometer and made it an accurate instrument. He first announced the law that "the heat evolved by a current of voltaic electricity in a metallic conductor was proportional to the resistance of the conductor multiplied by the square of the electric current." His great discovery of the equivalence of heat and energy he first announced in 1847, and he worked forty years to show by actual experiment the conservation of energy and the transformation of heat to work, and to discover and prove the equivalent of a heat unit to be 772 foot pounds; which coefficient is called the Golden Number of the nineteenth century.

*Work? The quantity of done and forgotten work that lies silent under my feet in this world, and escorts and attends me, and supports and keeps me alive, wheresoever I walk or stand, whatsoever I think or do, gives rise to reflections! Is it not enough, at any rate, to strike the thing called "Fame" into total silence for a wise man?*

—CARLYLE

1782.—Watt patented the working of steam expansively.  
1791.—Henry Jackson built the first steam-engine in Dublin.

LINUS YALE.

b. April 4, 1821.

d. December 24, 1868.

American inventor of locks for bankers' safes and vaults, the essential portion of which was some distance from the key-hole and isolated from the exterior of the door by a hardened steel plate, which covered the key-hole behind it; patented in 1851. He was a recognized authority on all matters pertaining to locks and safes. He also patented in 1858 a device for adjusting at a right angle the joiners' square; in 1865, one for reversing the motion of screw-taps, and in 1868, two for improvements in mechanics' vises. He adopted the dial and shaft as used in "combination locks" and subsequently perfected the mechanism known as the clock lock. His most radical invention was the double lock.

*Shun delays, they breed remorse,  
Take thy time, while time is lent thee;  
Creeping snails have weakest force—  
Fly their faults, lest thou repent thee.  
God is best when soonest wrought,  
Languering labors come to naught.*

—Delays; ROBERT SOUTHWELL.

*The Universe is an immeasurable wheel turning  
for evermore in the rapid and rushing river of  
Time.*

—LONGFELLOW.

Keys were originally made of wood and the earliest form was a simple crook. The ancient keys now to be found in the cabinets of the curious are mostly of bronze.

1843.—Fireproof safes were first made by Enos Wilder.

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MEMORANDA AND DIARY.

## DECEMBER 25.

ISAAC NEWTON.

b. December 25, 1642. d. March 20, 1727.

Trinity, Cambridge (Eng.), S. B. 1665.

English philosopher and mathematician. Inventor of the method of fluxions in 1666, the paper kite and a curious time-piece known as Isaac's Dial, which was the origin of dials on window-sills. He also produced the first toy wind-mill ever made. Much of his time and attention was devoted to the subject of gravity. He was one of the first experimental investigators of the nature and properties of heat. He made important investigations of the laws of gravitation.

*Superior beings, when of late they saw  
A mortal man unfold all nature's law,  
Admir'd such wisdom in an earthly shape,  
And shew'd a Newton, as we show an ape.*

—Essay on Man: POPE.

*Nature and Nature's laws lay hid in night;  
God said, "Let Newton be!" and all was light.*

—Sir Isaac Newton: POPE.

460 B. C.—Hippias of Elis discovered the transcendental curve quadratrix, a curve designed to divide an arc in a given ratio.

450 B. C.—Hippocrates of Chios is reputed to have been the first to effect the quadrature of a curvilinear figure.

1670.—Newton proved the law of gravitation; in 1682 he published the laws of gravitation; in 1686 he clearly explained the parallelogram of forces. Varignon and Lami enunciated the same principle in the same or the following year.

NOEL JEAN LEREBOURS.

b. December 25, 1764. d. February 13, 1840.

French optician. Inventor and maker of optical instruments. He also invented a micro-telescope.

*Unto the soul of man the same voice spoke,  
Advance!*

*From out the chaos thunder-like it broke,  
Advance!*

*Go, track the comet in its wheeling race,  
And drag the lightning from its hiding-place;  
From out the night of ignorance and tears  
Advance!*

*For love and hope, borne by the coming years,  
Advance!*

—D. F. MCCARTHY.

1600 (about).—Cornelis Van Drebbel invented his compound microscope.

1611.—Kepler made a telescope at Bohemia.

1690.—Telescopes with a singular lens were invented by Ehrentfried W. Tschirnhausen, at Saxony.

1710.—Solar microscopes are reputed to have been invented by Theodore Balthasar.

1740.—Benjamin Martin made great improvements in the microscope; he invented and sold pocket microscopes.

1758.—John Dolland combined flint and crown glass producing the achromatic lens.

1870.—R. S. Newall's telescope, having an object-glass 25 inches in diameter and a tube nearly 30 feet long, was set up at Gateshead.



1904.

SUNDAY.

1904.

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MEMORANDA AND DIARY.

## DECEMBER 26.

CHARLES BABBAGE.

b. December 26, 1792.

d. October 18, 1871.

English inventor of the calculating machine. In 1825 he, with Herschel, extended Arago's experiments on the magnetization of rotating plates and determined that "in the induction of magnetism time enters as an essential element." The "astatic" needle was devised for use in these researches. He made improvements in machinery and tools and invented a notation applicable to all mechanical actions, presented to the Royal Society, March 16, 1826, and afterwards applied to the analytical engine. He was the author of "On the Economy of Manufactures and Machinery," "Comparative View of the Different Life Assurance Societies" and "Differential and Integral Calculus."

*Be not indolent, be not careless. Watch your own thoughts; it will teach you the art of thinking. Accustom yourself to set them each to its proper service. You will have more work done and better. Mind can work upon itself and never to better purpose; all it knows from other sources will, by this means, become profitable; it is sowing the grain, not merely grinding it; and the produce will be accordingly abundant.*

—ISAAC TAYLOR.

1794.—The first approach to modern life insurance was made; all members were rated alike. In 1807 applicants were rated according to age and other circumstances.

EDMUND STONE.

b. about 1690.

d. April, 1768.

Scottish mathematician, who was self-educated. On April 22, 1725, he was admitted a Fellow of the Royal Society. The latter part of his life was spent in poverty. He published a "Mathematical Dictionary" (1726), a work on fluxions, a treatise on Euclid and other mathematical works.

*How vast the workroom where he brought  
The viewless implements of thought,  
That wit how subtle, how profound  
That nature's tangled webs unwound.*

Benjamin Peirce; HOLMES.

*When the king asked Euclid, the mathematician,  
whether he could not explain his art to him in a  
more compendious manner, he was answered, that  
there was no royal way to geometry. Other things  
may be seized by might, or purchased with money,  
but knowledge is to be gained only by study, and  
study to be prosecuted only in retirement.*

—JOHNSON.

1340.—John Mandith first used the terms *umbra* (tangent) and *umbra-recta* (cotangent); the Hindus introduced the sine, cosine, versed sine and tangent.

1699.—Albert Girard first explained the use of negative roots and described imaginary quantities, and inferred by induction that every equation has as many roots as there are units expressed in its degree.

1802-1839.—Niels Henrik Abel proved that equations of the fifth or higher degrees cannot be solved by radicals.

1904.

MONDAY.

1904.

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MEMORANDA AND DIARY.

## DECEMBER 27.

JACQUES OR JAMES BERNOULLI.

b. December 27, 1654. d. August 17, 1705.

Swiss mathematician. He was the first to solve what is called a differential equation. He applied the calculus to the solution of many important problems and suggested the kinetical theory of gases. He developed the doctrine of chances, which has been the logical guide of the exact sciences and has illuminated the pathway of the theory of evolution.

*Great Newton's self, to whom the world's in debt,  
Owed to School Mistress sage his Alphabet;  
But quickly wiser than his Teacher grown,  
Discovered properties to her unknown;  
Of A plus B, or minus, learned the use,  
Known quantities from unknown to deduce,  
And made—no doubt to that old dame's surprise—  
The Christ-Cross-Row his ladder to the skies.  
Yet, whatso'er Geometricians say,  
Her lessons were his true Principia.*

—Newton's Principia; CHARLES LAMB.

Al Karchi was the first to give and prove the theorems on consumption of series. In 1665 Newton discovered the binomial theory. In 1668 Nicolaus Mercator developed the logarithmic series, and showed the construction of logarithmic tables could be reduced by series to the quadrature of hyperbolic spaces. In 1715 Brook Taylor, the author of Taylor's theorem, made a like investigation independently. In 1742 Maclaurin published his Complete System of Fluxions and introduced analytic mechanics of three dimensions, using three axes, and in 1819 Horner's method of solving equations was published.

JOHANN KEPLER.

b. December 27, 1571. d. November 15, 1630.

German philosopher. In 1609 he produced his greatest work, "Astronomia nova, sen Physica celestis tradita Commentariis de Motibus Stellae Martis," in which he announced the laws (1) that the orbits of the planets are elliptical; (2) that the radius-vector, or line extending from a planet to the sun, describes or passes over equal areas in equal times; (3) that the squares of the periodic times of planets are proportional to the cubes of their mean distances from the sun. He also wrote "Dioptrica" (1611) in which he describes the astronomical telescope with two convex lenses. The invention is ascribed to him.

*Our Copernican globe is a great factory or shop of power, with its rotating constellations, times and tides. . . . The vat, the piston, the wheels and tires, never wear out, but are self-repairing. Is there any load which water cannot lift? If there be, try steam; or if not that, try electricity. Is there any exhausting of these means? Measure by barrels the spending of the brook that runs through your field. Nothing is great but the inexhaustible wealth of Nature. She shows us only surfaces, but she is million fathoms deep.*

—Resources; EMERSON.

813-842.—Alkindius wrote on astronomy and medicine.

1550-1631, December 20.—Michel Maestlin lived. He was the instructor of Kepler. He explained for the first time the faint illumination sometimes on the otherwise dark part of the moon.

1904.

TUESDAY.

1904.

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MEMORANDA AND DIARY.

## DECEMBER 28.

ROBERT WOODHOUSE.

b. April 28, 1773.

d. December 28, 1827.  
English mathematician. He wrote "The Principles of Analytical Calculation;" "A Treatise on Trigonometry;" "Treatise of Isoperimetrical Problems;" "An Elementary Treatise on Plane Astronomy" and several papers in the Philosophical Transactions. He was the first in England to explain and advocate the notation and methods of the Calculus.

*Self-ease is pain; thy only rest  
Is labor for a worthy end,  
A toil that gains with what it yields,  
And scatters to its own increase  
And hears, while sowing outward fields,  
The harvest song of inward peace.*

—WHITTIER.

500-428 B. C.—Anaxagoras was the first to determine the value of pie ( $\pi$ ).

408-355 B. C.—Eudoxus discovered extreme and mean ratio and proved the volume of a pyramid, a cone and that spheres were proportional to the cubes of their radii.

287-212 B. C.—Archimedes lived and proved that the area of a circle was equal to that of a triangle having the circumference for its base and the radius for its altitude. He also first found the upper limit for the value of  $\pi$ . Archimedes first proved that the surface of a sphere was equal to four great circles, and also the ratio or value for a segment of a sphere.

1548-1620.—Simon Stevin lived. He was the first to employ decimals in arithmetic, though he complicated the notation by inserting in the decimal place a symbol to indicate it.

EDWARD WRIGHT.

b.

d.

1615.

English mathematician. The true method of dividing the meridian line was first discovered by him. He wrote "The Correction of Certain Errors in Navigation" and "The Haven Finding Art."

*Knowledge hath a wildering tongue,  
And she will stoop and lead you to the stars;  
And witch you with her mysteries—till gold  
Is a forgotten dross, and power and fame  
Toys of an hour, and woman's careless love  
Lighs as the breath that breaks it.* —WILLIS.

*In the scholarly character, sought not for self-indulgence but for the service of mankind, is there not the harmony of all the efforts of the ages and millenniums hope of human learning?*

—PHILLIPS BROOKS.

1698, July 17—1759, July 27.—Pierre Louis de Maupertius lived. In 1736 he was sent to Lapland to measure a degree of the earth's meridian. The result of this experiment is his chief title to celebrity and it tended to confirm Newton's theory of the oblate form of the earth.

1790, March 19—1868, February 15.—William Rutter Savers lived. 1846.—He discovered a satellite of Saturn—Hyperion. He made several practical improvements in practical astronomy and invented the "wedge photometer."

1821, about—1879, April.—Daniel Vaughan lived. He studied the higher branches of science by himself. He contributed nearly fifty papers to the proceedings of learned societies. 1858.—He published "Etidiorpha;" "Popular Physical Astronomy, or an Exposition of Remarkable Celestial Phenomena."

1904.

WEDNESDAY.

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MEMORANDA AND DIARY.

## DECEMBER 29.

CHARLES GOODYEAR.

b. December 29, 1800. d. July 1, 1860.

American inventor. In 1834 he began his experiments with India rubber, which were carried on in different cities. His family was always in want and he himself was frequently in prison for debt. Two or three times when he believed all was coming as he desired, failure crowned his efforts. He was urged to abandon his experiments, but faith in ultimate success led him to persevere. He obtained a patent for vulcanized rubber in 1839, February, and one in 1844. At the end of five years he succeeded in producing, by means of sulphur, the vulcanized India rubber now used in manufacturing.

*The proudest motto for the young,  
Write it in lines of gold  
Upon thy heart, and in thy mind  
The stirring words enfold,  
And in misfortune's dreary hour,  
Or fortune's prosperous gale,  
'Twill have a holy, cheering power—  
There's no such word as fail.*

—*There's No Such Word as Fail.*

*Born to be plough'd with years, and sown with cares,  
And reap'd by death, lord of the human soil.*

—*Heaven and Earth: BYRON.*

India rubber first brought from South America about the beginning of the eighteenth century.

TITUS SALT.

b. September 20, 1803. d. December 29, 1876.

He was the first to establish the fact that Donskoi wool could be used in the worsted as well as in the woolen manufacture.

*Little they think, the giddy and the vain,  
How the sick weaver pines the incessant loom,  
Pent in the confines of one narrow room,  
While droops complaining his cheerless head;  
Little they think with what dull, anxious eyes,  
Nor by what nerveless, thin and trembling hands,  
The devious mingling of those various dyes,  
Were wrought to answer luxury's commands.*

—*The Weaver: MRS. C. E. NORTON.*

Naamah is accounted by some Rabbines the first inventor of making linen and woolen cloths. Both woolen and linen cloth were known in very early times.

1191.—Coarse woollens were introduced into England.

1340.—The first wool was spun in Worsted, Norfolk (whence its name).

1614.—Medleys, or mixed broadcloth, were first made.

1759, April 19—1828, March 27.—Amos Whittemore lived. He invented the card machine. He, with his brother, manufactured cotton and wool cards. 1797 he patented a machine for puncturing the leather and setting the wires, an operation that had previously been performed by hand.

1772.—Hargreaves applied the contrivance of a crank and comb to take wool off the cards in a continuous fleece.



1904.

THURSDAY.

1904.

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MEMORANDA AND DIARY.

## DECEMBER 30.

JAN BAPTISTA VAN HELMONT.

- b. 1577. d. December 30, 1644.  
Dutch chemist, physiologist and visionary alchemist. He was the first to use the word "gas" as the name of all elastic fluids except common air. He contributed to the science of physiology by an experiment on a willow tree, which he found to gain one hundred and sixty-four pounds while the soil in which it grew lost only a few ounces. Among his works are one on the magnetic cure of wounds and one on "The Origin of Medicine" (1648).

*Think truly, and thy thought  
Shall the world's famine feed;  
Speak truly, and thy word  
Shall be a fruitful seed;  
Live truly, and thy life shall be  
A great and noble creed.*

—ANONYMOUS.

*As on a rock of adamant, we build  
Our mountain hopes, spin our eternal schemes.  
As we the Fatal Sisters could outspin,  
And, big with life's futures, expire.*  
—*Night Thoughts*: YOUNG.

1727, April 7—1806, August 3.—Michel Adanson lived. In all his works he opposed the artificial system of Linnaeus. In 1748 he made a large collection of plants and animals in Senegal, Africa.

1744-1829.—Lamarck explained the gradual changes of plant life from the lower to the higher forms. He was the forerunner of Darwin.

SAMUEL MORLAND.

- b. about 1625. d. December 30, 1695.

English mechanician and inventor. Invented the speaking-trumpet in 1670, a capstan to heave up anchors and two arithmetical machines. He made important discoveries in hydrostatics. Although he did not invent the fire engine, he greatly improved it. The "plunger pump" was his invention, though sometimes reputed to be that of James Watt.

*To shape and finish forth, of rock and wood,  
Iron and brass, to fashion, mould and hew—  
In countless cunning forms to recreate,  
'Till the great God of order shall proclaim it "Good!"  
Proportioned fair, as in its first estate.*

*It consecrates whate'er it strikes—each blow,  
From the small whisper of the tinkling smith,  
Up to the big-voiced sledge that, heaving slow,  
Roars 'gainst the massy bar, and tears  
Its entrail, glowing, as with angry teeth—  
Anchors that hold a world should thus-wise grow.*  
—*The Mechanic*: CORNELIUS MATHEWS.

1675.—Van der Heides applied the suction-hose to a fire engine to supply it with water.  
1678.—John Hantefeuille proposed the application of steam to give motion to a piston.

1720.—Leopold, a German, invented a double-acting steam pump.

1732.—A modified form of bellows suction-pumps with pump handle and valves was invented by M. Boulogne.

1785.—Joseph Bramah secured the first patent on a hydrostatic or hydraulic press.

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MEMORANDA AND DIARY.

## DECEMBER 31.

HERMANN BOERHAAVE.

b. December 31, 1668. d. September 23, 1738.

German physician and writer on chemistry. Intended for the ministry and educated at Leyden. He did not study divinity but acquired a thorough knowledge of mathematics, algebra and the different branches of natural philosophy. His valuable works are written in Latin. He wrote a profound work on the History of Chemistry.

*There is the boy who is born with a taste for the sea, and must go thither if he has to run away from his father's house to the fore-castle; another longs for travel in foreign lands; another will be a lawyer; another, an astronomer; another, a painter, sculptor, architect, or engineer. Every individual man has a bias which he must obey, and it is only as he feels and obeys this that he rightly develops and attains his legitimate power in the world.*

—GREATNESS; EMERSON.

1404, January 13.—London. Parliament enacted that no chemist should use his craft to multiply gold or silver.

1789, February 12—1838, July 19.—Pierre Louis Dulong lived. In 1812 he discovered the chloride of nitrogen. In co-operation with Berzelius, he analyzed water and made researches in the animal heat produced by respiration and the combustion of carbon in the lungs.

1774.—Chlorine was discovered by Scheele.

1811.—Iodine was discovered by Courtois.

1836.—Bromine was discovered by Antoine Jerome.

JAMES COCHRAN.

b. 1763. d. December 31, 1846.

American inventor. He invented the art of making cut nails and also claims to have made the first copper cents in the United States.

*Hark the sonorous anvil's ring  
Labor music on the wing;  
The heavy strokes fall sure though slow,  
Moulding the iron as they go.  
Hark the shaping hammer's clack,  
Pointing and heading nails so quick;  
Cheerily swing in a stalwart hand—  
One of Labor's sinewy band.*

—LABOR; ANONYMOUS.

*This is a man's invention, and his hand.*

—AS YOU LIKE IT; SHAKESPEARE.

800 B. C.—The art of making and using dies for stamping coins was known.

1640.—The first louis d'or pieces were struck at Paris.

1652.—Mint for coining money, machinery sent from England to Massachusetts.

1687.—Copper cent coined at New Haven, Conn.

1766, July 9—1840, July 30.—Jacob Perkins lived. He invented a machine for plating shoe-buckles with gold, a machine for cutting and heading nails, a stamp to prevent the counterfeiting of bank bills; which were followed by the invention of the check-plate. He also effected improvements in hardening and softening steel and invented the bathometer and the pleometer and steam artillery. He was the father of the compression system, invented in 1834.

1792, September 7.—The mint at Philadelphia was opened.

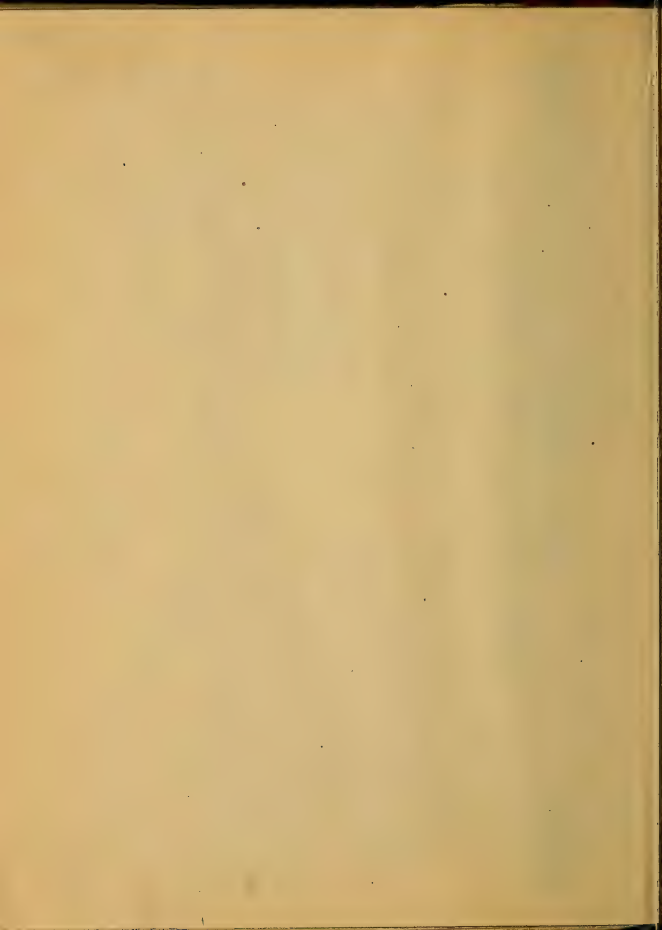
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MEMORANDA AND DIARY.



## CALENDAR OF INVENTION AND DISCOVERY.

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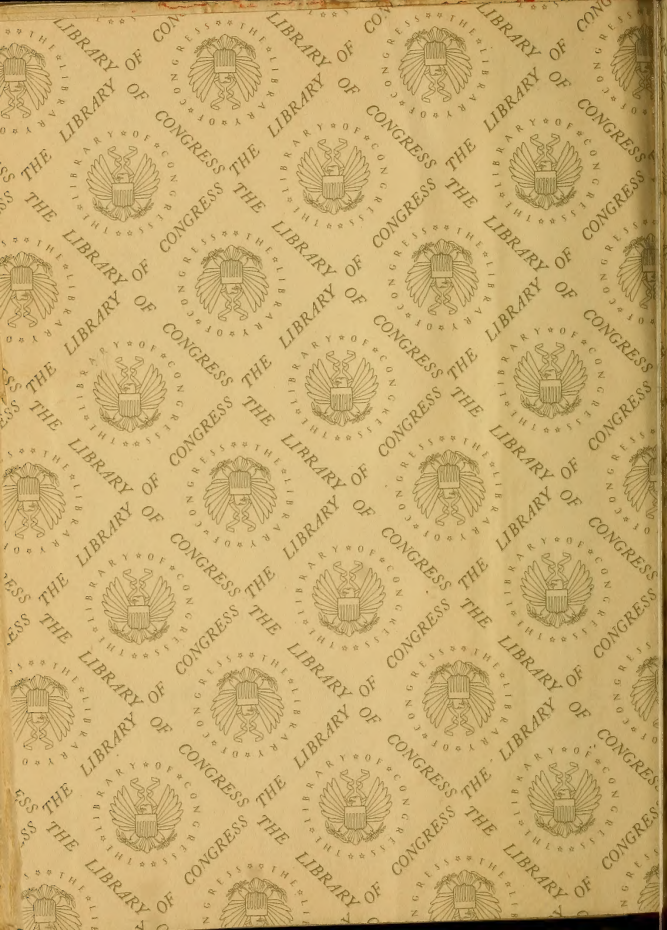
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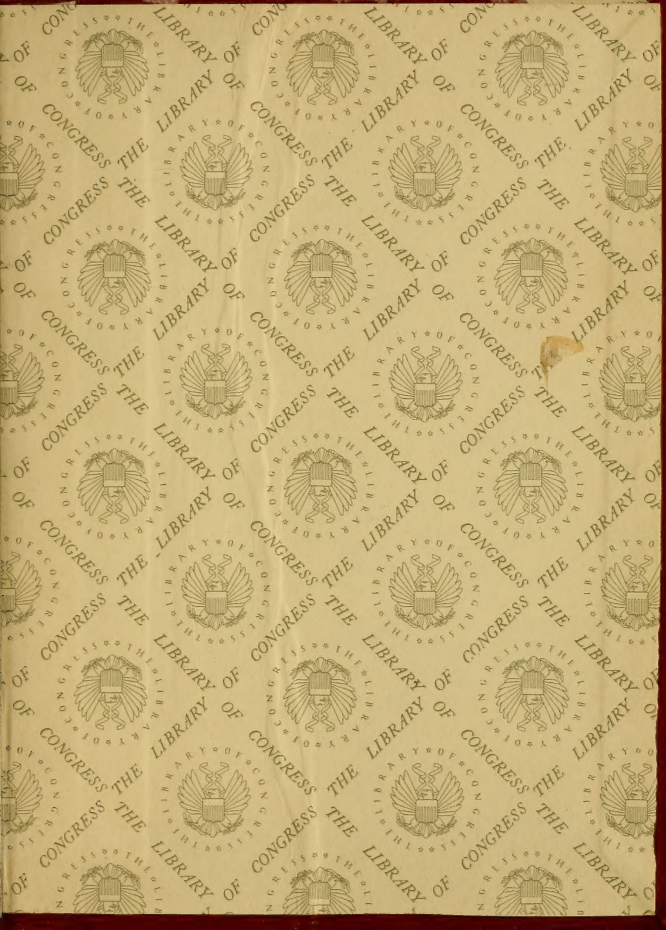
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